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TIA STANDARD

Project 25 Trunking Control Channel Messages - New Technology Standards Project - Digital Radio Technical Standards

TIA-102.AABC-B (Revision of TIA/EIA-102.AABC-A)

January 2005

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SP-3-4661-RV2 TIA-102.AABC-B

Foreword

(This foreword is not part of this standard.)

This document has been submitted to APCO/NASTD/FED by the Telecommunications Industry Association (TIA), as provided for in a Memorandum of Understanding (MOU) dated December 1993. That MOU provides that APCO/NASTD/FED will devise a Common System Standard for digital public safety communications (the Standard), and that TIA shall provide technical assistance in the development of documentation for the Standard.

This document has been developed with inputs from the APCO/TIA Project 25 Interface Committee (APIC), the APIC Trunking Task Group, and TIA Industry members.

This document is being published because it is felt that there is an urgent need for technical information on the emerging digital techniques for Land Mobile Radio Service.

This document describes the control channel messages for trunked systems meeting the Project 25 requirements. These definitions are necessary to insure interoperability of trunked radio units. This document includes normative annexes A through C, and informative annexes D through F.

As other documents describing the trunking protocol are developed, this document will be subject to change. Additional reason codes and additional messages covering working channel maintenance may be needed. Some efforts have been made to ensure accuracy, but it should be understood that conformance tests remain to be developed and proven.

This document is a standard. It presents an overview of trunking messages which was recommended by TIA to APCO/NASTD/FED as being suitable for use as part of their standard for a digital public safety radio system (Project 25). TIA expects that APCO/NASTD/FED will establish and publish one or more standards for trunking operation.



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SP-3-4661-RV2 TIA-102.AABC-B

TABLE OF CONTENTS

1.0 Introduction	1
1.1 Scope.....	1
1.2 Revision History	1
1.3 References.....	3
1.3.1 Normative References.....	3
1.3.2 Informative References	3
1.4 Number Nomenclature	4
1.5 Reserved	4
1.6 Abbreviations and Acronyms	4
1.7 Obsolescence	5
2.0 Trunking Packet Description	6
2.1 Single Block Packet Structure.....	6
2.2 Multiple Block Packet Structure	8
2.3 Field Definitions	9
2.3.1 Additional Information.....	10
2.3.2 Additional Information Valid Flag (AIV).....	10
2.3.3 Announcement Group Address	10
2.3.4 Answer Response	10
2.3.5 Base Frequency	10
2.3.6 BW	11
2.3.7 BW VU	11
2.3.8 Call Timer	11
2.3.9 Channel.....	11
2.3.10 Channel Spacing	12
2.3.11 Data Access Control (DAC).....	12
2.3.12 Data Service Options	13
2.3.13 Digit	14
2.3.14 Digit Count	14
2.3.15 Extended Function	15
2.3.16 Group Address	16
2.3.17 Group ID.....	17
2.3.18 Home System.....	17
2.3.19 Identifier	17
2.3.20 Location Registration Area (LRA).....	17
2.3.21 Message.....	18
2.3.22 Reason Code	18
2.3.23 RF Sub-System ID	18
2.3.24 Service Options.....	18
2.3.25 Service Type	20
2.3.26 Site ID	20
2.3.27 Source Address.....	20
2.3.28 Source ID	20
2.3.29 Status	21
2.3.30 Subscriber Unit Address.....	21



SP-3-4661-RV2 TIA-102.AABC-B

2.3.31 System ID	22
2.3.32 System Service Class	22
2.3.33 Target Address	22
2.3.34 Target ID	23
2.3.35 Transmit Offset	23
2.3.36 Transmit Offset VU	23
2.3.37 WACN ID	24
2.3.38 Tone Signal	24
3.0 Categorization	25
4.0 Voice Service	26
4.1 Voice Service ISPs	26
4.1.1 Group Voice Service Request (GRP_V_REQ)	27
4.1.2 Unit To Unit Voice Service Request (UU_V_REQ)	28
4.1.3 Unit To Unit Voice Service Answer Response (UU_ANS_RSP)	30
4.1.4 Telephone Interconnect Request-Explicit Dialing (TELE_INT_DIAL_REQ)	32
4.1.5 Telephone Interconnect Request-Implicit Dialing (TELE_INT_PSTN_REQ)	35
4.1.6 Telephone Interconnect Answer Response (TELE_INT_ANS_RSP)	36
4.2 Voice Service OSPs	37
4.2.1 Group Voice Channel Grant (GRP_V_CH_GRANT)	37
4.2.2 Group Voice Channel Grant Update (GRP_V_CH_GRANT_UPDT)	39
4.2.3 Group Voice Channel Update-Explicit (GRP_V_CH_GRANT_UPDT_EXP)	40
4.2.4 Unit to Unit Answer Request (UU_ANS_REQ)	41
4.2.5 Unit to Unit Voice Service Channel Grant (UU_V_CH_GRANT)	43
4.2.6 Telephone Interconnect Voice Channel Grant (TELE_INT_CH_GRANT)	45
4.2.7 Telephone Interconnect Answer Request (TELE_INT_ANS_REQ)	47
4.2.8 Unit to Unit Voice Channel Grant Update (UU_V_CH_GRANT_UPDT)	48
4.2.9 Tel. Interconnect Channel Grant Update (TELE_INT_CH_GRANT_UPDT)	50
5.0 Data Service	52
5.1 Data Service ISPs	52
5.1.1 Individual Data Service Request (IND_DATA_REQ) - Obsolete	53
5.1.2 Group Data Service Request (GRP_DATA_REQ) - Obsolete	55
5.1.3 Sndcp Data Channel Request (SN-DATA_CHN_REQ)	56
5.1.4 Sndcp Data Page Response (SN-DATA_PAGE_RES)	57
5.1.5 Sndcp Reconnect Request (SN-REC_REQ)	58
5.2 Data Service OSPs	59
5.2.1 Individual Data Channel Grant (IND_DATA_CH_GRANT)) - Obsolete	60
5.2.2 Group Data Channel Grant (GRP_DATA_CH_GRANT) - Obsolete	62
5.2.3 Group Data Channel Announcement (GRP_DATA_CH_ANN) - Obsolete	64
5.2.4 Group Data Channel Announcement, Explicit (GRP_DATA_CH_ANN_EXP) - Obsolete	65
5.2.5 Sndcp Data Channel Grant (SN-DATA_CHN_GNT)	66
5.2.6 Sndcp Data Page Request (SN-DATA_PAGE_REQ)	67
5.2.7 Sndcp Data Channel Announcement - Explicit (SN-DATA_CHN_ANN_EXP)	67
6.0 Control and Status Services	69
6.1 Control and Status ISPs	69



6.1.1 Acknowledge Response - Unit (ACK_RSP_U).....	70
6.1.2 Authentication Query (AUTH_Q).....	72
6.1.3 Authentication Response (AUTH_RSP).....	74
6.1.4 Call Alert Request (CALL_ALRT_REQ).....	75
6.1.5 Cancel Service Request (CAN_SRV_REQ).....	77
6.1.6 Emergency Alarm Request (EMRG_ALRM_REQ).....	78
6.1.7 Extended Function Response (EXT_FNCT_RSP).....	78
6.1.8 Group Affiliation Query Response (GRP_AFF_Q_RSP).....	79
6.1.9 Group Affiliation Request (GRP_AFF_REQ).....	80
6.1.10 Identifier Update Request (IDEN_UP_REQ).....	82
6.1.11 Message Update Request (MSG_UPDT_REQ).....	83
6.1.12 Protection Parameter Request (P_PARM_REQ).....	85
6.1.13 Status Query Request (STS_Q_REQ).....	86
6.1.14 Status Query Response (STS_Q_RSP).....	88
6.1.15 Status Update Request (STS_UPDT_REQ).....	90
6.1.16 Unit Registration Request (U_REG_REQ).....	92
6.1.17 De-Registration Request (U_DE_REG_REQ).....	93
6.1.18 Location Registration Request (LOC_REG_REQ).....	94
6.1.19 Radio Unit Monitor Request (RAD_MON_REQ).....	97
6.1.20 Roaming Address Request (ROAM_ADDR_REQ).....	98
6.1.21 Roaming Address Response (ROAM_ADDR_RSP).....	100
6.2 Control and Status OSPs.....	104
6.2.1 Acknowledge Response - FNE (ACK_RSP_FNE).....	105
6.2.2 Adjacent Status Broadcast (ADJ_STS_BCST).....	106
6.2.3 Authentication Command (AUTH_CMD).....	108
6.2.4 Call Alert (CALL_ALRT).....	109
6.2.5 Deny Response (DENY_RSP).....	111
6.2.6 Extended Function Command (EXT_FNCT_CMD).....	112
6.2.7 Group Affiliation Query (GRP_AFF_Q).....	113
6.2.8 Group Affiliation Response (GRP_AFF_RSP).....	115
6.2.9 Identifier Update (IDEN_UP).....	117
6.2.10 Message Update (MSG_UPDT).....	119
6.2.11 Network Status Broadcast (NET_STS_BCST).....	121
6.2.12 Protection Parameter Broadcast (P_PARM_BCST).....	123
6.2.13 Protection Parameter Update (P_PARM_UPDT).....	125
6.2.14 Queued Response (QUE_RSP).....	126
6.2.15 RFSS Status Broadcast (RFSS_STS_BCST).....	127
6.2.16 Secondary Control Channel Broadcast (SCCB).....	129
6.2.17 Status Query (STS_Q).....	130
6.2.18 Status Update (STS_UPDT).....	132
6.2.19 System Service Broadcast (SYS_SRV_BCST).....	134
6.2.20 Unit Registration Command (U_REG_CMD).....	136
6.2.21 Unit Registration Response (U_REG_RSP).....	137
6.2.22 De-Registration Acknowledge (U_DE_REG_ACK).....	139
6.2.23 Location Registration Response (LOC_REG_RSP).....	140
6.2.24 Radio Unit Monitor Command (RAD_MON_CMD).....	141
6.2.25 Roaming Address Command (ROAM_ADDR_CMD).....	142



SP-3-4661-RV2 TIA-102.AABC-B

6.2.26 Roaming Address Update (ROAM_ADDR_UPDT)143

6.2.27 Time and Date Announcement (TIME_DATE_ANN).....146

6.2.28 Secondary Control Channel Broadcast - Explicit (SCCB_EXP)148

6.2.29 Identifier Update (IDEN_UP_VU) for VHF/UHF Bands149

Annex A. Cancel Reason Codes (Normative).....151

Annex B. Deny Response Reason Codes (Normative)152

Annex C. Queued Response Reason Codes (Normative).....153

Annex D. ISP and OSP Lists (Informative)154

Annex E. List of Acronyms (Informative)158

Annex F. Trunking Channel Addressing (Informative)161

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List of Figures

Figure 2.1-1 General TSBK Structure	6
Figure 2.2-1 MBT Packet Header Block Structures	8
Figure 2.2-2 Multiple Block Trunking Packet Last Block Structure.....	9
Figure 2.3.9-1 Channel Field.....	11
Figure 2.3.11-1 Data Access Control Field	13
Figure 2.3.12-1 Data Service Options Field	13
Figure 2.3.15-1 Extended Function Subfields	15
Figure 2.3.24-1 Service Options Field Definition.....	18
Figure 2.3.24-2 Default Service Options Field Values	20
Figure 2.3.29-1 Status Field.....	21
Figure 4.1.1-1 Group Voice Service Request Format	27
Figure 4.1.2-1 Unit to Unit Voice Service Request - Abbreviated Format	28
Figure 4.1.2-2 Unit to Unit Voice Service Request - Extended Format	29
Figure 4.1.3-1 Unit to Unit Voice Service Answer Response Abbreviated Format...	30
Figure 4.1.3-2 Unit to Unit Voice Service Answer Response Extended Format.....	31
Figure 4.1.4-1 Explicit Dialing (up to 10 dialed digits)	32
Figure 4.1.4-2 Explicit Dialing (>10 dialed digits)	33
Figure 4.1.5-1 Telephone Interconnect Request with PSTN Address.....	35
Figure 4.1.6-1 Telephone Interconnect Answer Response Format.....	36
Figure 4.2.1-1 Group Voice Channel Grant - Short Channel Form	37
Figure 4.2.1-2 Group Voice Channel Grant - Explicit Channel Form	38
Figure 4.2.2-1 Group Voice Channel Grant Update	39
Figure 4.2.3-1 Group Voice Channel Grant Update - Explicit Channel Form.....	40
Figure 4.2.4-1 Unit to Unit Answer Request Abbreviated Format	41
Figure 4.2.4-2 Unit to Unit Answer Request Extended Format	42
Figure 4.2.5-1 Unit to Unit Voice Service Channel Grant - Abbreviated Format	43
Figure 4.2.5-2 Unit to Unit Voice Channel Grant - Extended Format	44
Figure 4.2.6-1 Telephone Interconnect Channel Grant - Short Channel Form	45
Figure 4.2.6-2 Telephone Interconnect Channel Grant - Explicit Channel Form.....	46
Figure 4.2.7-1 Telephone Interconnect Answer Request Format	47
Figure 4.2.8-1 Unit to Unit Voice Channel Grant Update - Abbreviated Format.....	48
Figure 4.2.8-2 Unit to Unit Voice Channel Grant Update - Extended Format.....	49
Figure 4.2.9-1 Tel. Interconnect Channel Grant Update - Short Channel Form.....	50
Figure 4.2.9-2 Tel. Interconnect Channel Grant Update - Explicit Channel Form	51
Figure 5.1.1-1 Individual Data Service Request.....	53
Figure 5.1.1-2 Individual Data Service Request - Extended Format	54
Figure 5.1.2-1 Group Data Service Request.....	55
Figure 5.1.3-1 SMDCP Data Channel Request.....	56
Figure 5.1.4-1 SMDCP Data Page Response	57
Figure 5.1.5-1 SMDCP Reconnect Request.....	58
Figure 5.2.1-1 Individual Data Channel Grant - Abbreviated Format	60
Figure 5.2.1-2 Unit to Unit Voice Channel Grant - Extended Format	61
Figure 5.2.2-1 Group Data Channel Grant - Abbreviated Format	62
Figure 5.2.2-2 Group Data Channel Grant - Extended Format	63
Figure 5.2.3-1 Group Data Channel Announcement.....	64



SP-3-4661-RV2 TIA-102.AABC-B

Figure 5.2.4-1 Group Data Channel Announcement - Explicit	65
Figure 5.2.5-1 SDCP Data Channel Grant	66
Figure 5.2.6-1 SDCP Data Page Request	67
Figure 5.2.7-1 SDCP Data Channel Announcement - Explicit	68
Figure 6.1.1-1 Acknowledge Response - Unit (Abbreviated Format)	70
Figure 6.1.1-2 Acknowledge Response - Unit (Extended Format)	71
Figure 6.1.2-1 Authentication Query - Abbreviated Format	72
Figure 6.1.2-2 Authentication Query - Extended Format	73
Figure 6.1.3-1 Authentication Response	74
Figure 6.1.4-1 Call Alert Request - Abbreviated Format	75
Figure 6.1.4-2 Call Alert Request - Extended Format	76
Figure 6.1.5-1 Cancel Service Request	77
Figure 6.1.6-1 Emergency Alarm Request	78
Figure 6.1.7-1 Extended Function Command	78
Figure 6.1.8-1 Group Affiliation Query Response	79
Figure 6.1.9-1 Group Affiliation Request - Abbreviated Format	80
E 81	
Figure 6.1.9-2 Group Affiliation Request - Extended Format	81
Figure 6.1.10-1 Identifier Update Request	82
Figure 6.1.11-1 Message Update Request - Abbreviated Format	83
Figure 6.1.11-2 Message Update Request - Extended Format	84
Figure 6.1.12-1 Protection Parameter Request	85
Figure 6.1.13-1 Status Query Request - Abbreviated Format	86
Figure 6.1.13-2 Status Query Request - Extended Format	87
Figure 6.1.14-1 Status Query Response - Abbreviated Format	88
Figure 6.1.14-2 Status Query Response - Extended Format	89
Figure 6.1.15-1 Status Update Request - Abbreviated Format	90
Figure 6.1.15-2 Status Update Request - Extended Format	91
Figure 6.1.16-1 Unit Registration Request	92
Figure 6.1.17-1 De-Registration Request	93
Figure 6.1.18-1 Location Registration Request - Abbreviated Format	94
Figure 6.1.18-2 Location Registration Request - Extended Format	96
Figure 6.1.19-1 Radio Unit Monitor Request	97
Figure 6.1.20-1 Roaming Address Request - Abbreviated Format	98
Figure 6.1.20-2 Roaming Address Request - Extended Format	99
Figure 6.1.21-1 Roaming Address Response - Abbreviated Format	100
Figure 6.1.21-2 Roaming Address Response - Extended Format 1	101
Figure 6.1.21-3 Roaming Address Response - Extended Format 2	102
Figure 6.1.21-4 Roaming Address Response - Extended Format 3	103
Figure 6.2.1-1 Acknowledge Response - FNE	105
Figure 6.2.1-2 Additional Information (AIV=1, EX=1)	105
Figure 6.2.1-3 Additional Information (AIV=1, EX=0)	105
Figure 6.2.2-1 Adjacent Status Broadcast	106
Figure 6.2.2-2 Adjacent Status Broadcast - Extended Format	107
Figure 6.2.3-1 Authentication Command	108
Figure 6.2.4-1 Call Alert - Abbreviated Format	109
Figure 6.2.4-2 Call Alert - Extended Format	110



Figure 6.2.5-1 Deny Response	111
Figure 6.2.6-1 Extended Function Command	112
Figure 6.2.7-1 Group Affiliation Query - Abbreviated Format	113
Figure 6.2.7-2 Group Affiliation Query - Extended Format	114
Figure 6.2.8-1 Group Affiliation Response - Abbreviated Format	115
Figure 6.2.8-2 Group Affiliation Response - Extended Format	116
Figure 6.2.9-1 Identifier Update	117
Figure 6.2.9-2 Identifier Update Message for the VHF and UHF Bands	117
Figure 6.2.10-1 Message Update - Abbreviated Format	119
Figure 6.2.10-2 Message Update - Extended Format	120
Figure 6.2.11-1 Network Status Broadcast	121
Figure 6.2.11-2: Network Status Broadcast - Extended Format	122
Figure 6.2.12-1 Protection Parameter Broadcast	124
Figure 6.2.13-1 Protection Parameter Update	125
Figure 6.2.14-1 Queued Response	126
Figure 6.2.15-1 RFSS Status Broadcast	127
Figure 6.2.15-2: RFSS Status Broadcast (RFSS_STS_BCST) - Extended Format	128
Figure 6.2.16-1 Secondary Control Channel Broadcast	129
Figure 6.2.17-1 Status Query - Abbreviated Format	130
Figure 6.2.17-2 Status Query - Extended Format	131
Figure 6.2.18-1 Status Update - Abbreviated Format	132
Figure 6.2.18-2 Status Update - Extended Format	133
Figure 6.2.19-1 System Service Broadcast	134
Figure 6.2.20-1 Unit Registration Command	136
Figure 6.2.21-1 Unit Registration Response - Abbreviated Format	137
Figure 6.2.21-2 Unit Registration Response - Extended Format	138
Figure 6.2.22-1 De-Registration Acknowledge	139
Figure 6.2.23-1 Location Registration Response	140
Figure 6.2.24-1 Radio Unit Monitor Command	141
Figure 6.2.25-1 Roaming Address Command	142
Figure 6.2.26-1 Roaming Address Update - Extended Format 1	143
Figure 6.2.26-2 Roaming Address Update - Extended Format 2	144
Figure 6.2.26-3 Roaming Address Update - Extended Format 3	145
Figure 6.2.27-1 Time and Date Announcement	146
Figure 6.2.28-1: Secondary Control Channel Broadcast - Explicit (SCCB_EXP) ...	148
Figure 6.2.29-1: Identifier Update Message for VHF/UHF Bands	149
Figure F-1 Example Channel Calculation	162



SP-3-4661-RV2 TIA-102.AABC-B

List of Tables

Table 2.2-1 SAP Values For MBT Packet.....	9
Table 2.3.4-1 Answer Response Values.....	10
Table 2.3.7-1 BW VU Values.....	11
Table 2.3.13-1 Digit Values.....	14
Table 2.3.15-1 Extended Function Values.....	16
Table 2.3.16-1 Group Address Values.....	16
Table 2.3.21-1 Message Values.....	18
Table 2.3.24-1 Priority Level Values.....	19
Table 2.3.29-1 User Status Values.....	21
Table 2.3.29-2 Unit Status Values.....	21
Table 2.3.30-1 Subscriber Unit Values.....	21
Table 2.3.38 –1 Tone Signal Values.....	24
Table 4.1-1 Voice Service ISPs.....	26
Table 4.1.5-1 PSTN Address Descriptions.....	35
Table 4.2-1 Voice Service OSPs.....	37
Table 5.1-1 Data Service ISPs.....	52
Table 5.2-1 Data Service OSPs.....	59
Table 6.1-1 Control and Status ISPs.....	69
Table 6.2-1 Control and Status OSPs.....	104
Table 6.2.19-1 Normal System Services.....	135
Table 6.2.19-2 Extended System Services.....	135
Table 6.2.25-1 Stack Operations.....	142



SP-3-4661-RV2 TIA-102.AABC-B

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1.0 Introduction

This document defines the messages to control trunking system operation on the common air interface for Project 25. Section 2 defines over all structure of the messages and several of the common fields. Section 3 categorizes messages into voice, data, control and status. Voice control messages are then listed in section 4. Data control messages are listed in section 5. General purpose control and status messages for trunking are listed in section 6.

1.1 Scope

Project 25 digital radio systems will optionally support a trunking mode of operation. This document provides an overview of the essential attributes of the trunking control channel messaging such that, where systems are configured in the trunking mode, voice and data services will operate in accordance with the goals of Project 25:

- support any Project 25 trunking radio,
- interoperate across any Project 25 digital radio trunking system,
- independent of the particular equipment manufacturer,

This document will describe the presentation on the trunking system with respect to the Inbound Signaling Packet (ISP) and Outbound Signaling Packet (OSP) of the control channel.

1.2 Revision History

931020	v1.2	This added the detail to the Section 3 Voice service, Section 4 Data service, and some information to Section 5 Control and Status service.
931125	v1.3	This adds Section 5.0 Control and Status, and Annex D. ISP and OSP Lists.
940308	v1.4	This addresses comments to the previous v1.3.
940715	v1.5	This incorporates comments from Stanilite, 4/27/94.
941010		Document format updates appropriate for TSB ballot and Change-Bars from v1.5 removed.
941201		Modifications per the ballot comment resolutions. Some key changes are: - removed service descriptives - generalized message formats - generalized unit addresses - generalized group addresses - removed Message bit from the options field



SP-3-4661-RV2 TIA-102.AABC-B

- added separate announcement and system wide group service requests
 - added extended format for group affiliation request
 - added extended format for unit registration response
- 950226 Modifications per the comment resolutions. Some key changes are:
- replace "T-bit" with "Last Block Flag" in single block formats
 - updated channel information
 - removed references to TOF
 - User and Unit status combined to one transaction
 - added Messages transaction
 - added Call Alert transaction
 - added extended formats to explicitly cite separate receive and transmit frequency information for a channel
 - added Extended Function transaction set
- 950815
- Incorporated the Extended Messages formats supplied by a manufacturer
 - Changed the telephone dialing per UNTG request
 - Modified the channel frequency table references
- 960314 Revisions for the letter ballot comments.
- 960531 Minor Revisions for more letter ballot comments.
- 970320 v2.0 Updates for group and unit address ranges. Revised Answer Response and System Service Classe definitions. Revised Adjacent Status Broadcast, Group Affiliation Response, RFSS Status Broadcast, Unit Registration Response, Location Registration Response.
- 970714 v2.1 Corrected Status and Message updates for extended formats. Added consistent Service Options to unit-to-unit response.
- 970910 v2.2 Corrected the example channel identifier.
- 980210 v2.3 Removed spaces from opcode binary numbers.
- 991123 v3.1 Incorporated Addendum 1 and revisions for VHF & UHF bands.
- 000330 v3.2 Incorporated comments from letter ballot.
- 030522 v3.3 Merged Addenda 1 (SND CP Trunking Control Channel Messages) and Addenda 2 (Multiband Operations). Added obsolete reference and obsoleted non-SN data messages.
- 030611 v3.4 Incorporated comments received during 6/10/03 TR8.10 meeting to; 1) update and correct all references to current section numbers, figures and tables 2) Clarify use of octet 9 in



SP-3-4661-RV2 TIA-102.AABC-B

		SYS_SRV_BCAST message 3) Opcode 6 bit field clarifications
		4) Clarify source/target address/ID text
040113	v3.5	Merge Addenda 1 & 2, mark some messages as obsolete, add Tone Signaling, and make editorial corrections.
040301	v4.0	Update for Emergency Flexibility bit in: §6.1.8 Group Affiliation Query Response (GRP_AFF_Q_RSP) §6.1.9 Group Affiliation Request (GRP_AFF_REQ), §6.1.16 Unit Registration Request (U_REG_REQ), §6.1.18 Location Registration Request (LOC_REG_REQ) Update for Manufacturer ID = \$01 in §1.5 Reserved, and §2.1 Single Block Packet Structure Formatting changes and add acronyms
040412	v4.1	Version Balloted (closed 2004-5-28)
040718	v4.2	Resolve Comments from Ballot (closed 2004-5-28)

1.3 References

The following documents contain provisions which, through reference in this text, constitute provisions of this document. At the time of publication, the editions indicated were valid. All standards are subject to revision, and parties to agreements based on this document are encouraged to investigate the possibility of applying the most recent editions of the documents listed below. ANSI and TIA maintain registers of currently valid national standards published by them.

1.3.1 Normative References

1. TIA-102.BAAA-A, *Recommended Common Air Interface* - This document describes the basic over the air formats used on the Trunking control channel.
2. TIA-102.AABA-A, *Trunking Overview* - This document describes the general offerings for the Trunking system.
3. TIA-102.AABB-A, *Trunking Control Channel Formats* - This document describes the general Trunking control channel structures to be utilized in this document.
4. TIA-102.BAAC-A "Project 25 - Common Air Interface - Reserved Values".

1.3.2 Informative References

5. Project 25 Statement of Requirements – This document describes the User requirements for the Project 25 Public Safety radio systems. It includes the tone descriptions, durations, and audio levels for the Emergency, Acknowledge, Message Alert, and Channel Marker tones.



SP-3-4661-RV2 TIA-102.AABC-B

6. TSB-102.AABD, *Trunking Procedures* - This document addresses the specific service needs, operations, and information content to satisfy the Trunking service need.

1.4 Number Nomenclature

There are references to bit patterns in the following discussion of service support. In general the following applies:

If a number is preceded by a "%" the number is to be interpreted as a binary representation with the appropriate number of symbols (e.g. %1010 is 4 symbol binary for 10)

If a number is preceded by a "\$" the number is to be interpreted as a hexadecimal representation with the appropriate number of symbols. (e.g. \$0A is 2 symbol hexadecimal for 10)

If a number is presented with neither a "%" or "\$" preceding it, the number is to be considered as a decimal representation with the appropriate number of symbols. (e.g. 15 is decimal 15)

1.5 Reserved

The reference to "Reserved" in the definitions of the packet formats is to be interpreted throughout this document to denote the following:

"Reserved" are those bits which fill in the code words when no additional information is necessary. "Reserved" bits are specified as '0' in the transmitter and they are ignored in the receiver. They are reserved for possible future definition. Any implementation which uses them (i.e., sets them to non-zero values) must assert the Manufacturer's ID (MFID) (i.e., set this to other than the standard values).

The values for the Manufacturer ID's are given in Ref. 4 - TIA-102.BAAC-A "Project 25 - Common Air Interface - Reserved Values". As of 2004/2/25, an MFID of \$00 or \$01 (the standard values) indicates a Standard Project 25 message.

(This definition is consistent with that used in the CAI terminology.)

1.6 Abbreviations and Acronyms

Appendices D and E contain a list of acronyms and abbreviations used in this document. In most cases, the abbreviation is used in the text in parentheses following the term that it abbreviates.

1.7 Obsolescence

The reference to "Obsolete" is used to indicate specific sections of the document which are no longer current. The term is typically used in this document to indicate that specific control channel messages are no longer supported by the standard and have typically been replaced with another mechanism. The messages are left in the document as previous implementations may have made assumptions about their use and specifically the corresponding opcode may not be re-used.



2.0 Trunking Packet Description

The control channel shall support both single and multiple block packet formats, both outbound and inbound. The single and multiple block control channel packet formats are defined in the Trunking Control Channel Format document, reference 3.

Throughout this document if the format is not explicitly stated for a transaction, the single block packet format is to be applied.

2.1 Single Block Packet Structure

The single block structure is a 12 octet structure. Figure 2.1-1 illustrates the general structure of the Trunking single block format, the Trunking Signaling Block (TSBK).

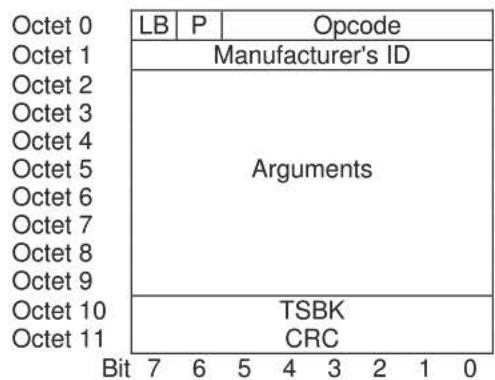


Figure 2.1-1 General TSBK Structure

Following is the general description of the fields of this TSBK:

Last block flag (LB) - (Octet 0, Bit 7)

- this indicates whether more TSBKs should be expected in this packet:
 - 0 = other TSBKs to follow for this packet
 - 1 = last (only) TSBK for this packet

Protected trunking block flag (P) - (Octet 0, Bit 6)

- this designates the protection mode for this TSBK
 - = 0 - non-protected mode
 - = 1 - protected mode



SP-3-4661-RV2 TIA-102.AABC-B

Opcode - (Octet 0, Bit 5-0)

- this field is the key to defining the contents of the TSBK. It assigns a meaning to the overall TSBK (e.g. unit to unit voice service request, system status broadcast, etc.), and defines how the Arguments field will be parsed and populated pertaining to this control channel message. (The opcodes, under the Standard Project 25 Manufacturer's ID, are meant to be system independent definitions, with the same opcodes depicting the same information in any system.)

Manufacturer's ID - (Octet 1)

- identifies the manufacturer for non-standard control channel messaging. The values for the Manufacturer ID's are given in Ref. 4 - TIA-102.BAAC-A "Project 25 - Common Air Interface - Reserved Values". As of 2004/2/25, an MFID of \$00 or \$01 indicates a Standard Project 25 message.

Throughout this document, the Manufacturer's ID field is to assume the Standard Project 25 Manufacturer's ID of \$00 for each of the cited message definitions, unless an explicit value is given. Thus, if another standard value (e.g., MFID=\$01) is required, it needs to be explicitly stated in the definition.

Arguments - (Octets 2-9)

- this field will contain information to further define the control channel message beyond the Opcode information. The partitioning of this field is directly related to the specific Opcode values, and may be only partially populated. The unused area of this field will be filled with nulls.

TSBK CRC - (Octets 10-11)

- this is the CRC parity check as described in the CAI, reference 1, section 6.2. It provides error detection for the information of this TSBK (Octets 0-9).



2.2 Multiple Block Packet Structure

The Multiple Block Trunking (MBT) packet structure is based upon the Unconfirmed Data Packet structure (CAI, reference 1, section 6). There is a specific Header Block followed by one or more Data blocks of trunking information. Figure 2.2-1 illustrates the general structure of the Header Block for the MBT packet using the unconfirmed data format. Each of the Data blocks consist of 12 octets.

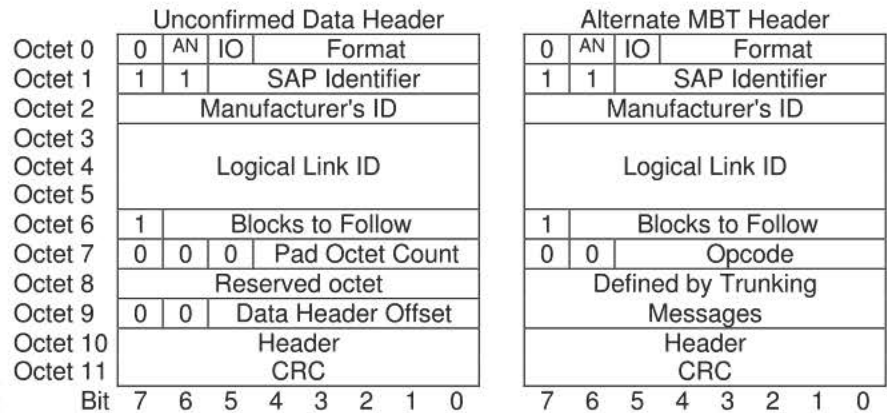


Figure 2.2-1 MBT Packet Header Block Structures

The field descriptions for the MBT Packet Header Block are those of the Unconfirmed Data Packet Header as described in the CAI, reference 1, section 6.6, and shall apply to this block structure except for those directly related to the Trunking application as cited below:

- IO (Octet 0, Bit 5)
- identifies whether this is an inbound or outbound packet. For the MBT, this resolves to:
 - =0 if this is a multiple block ISP
 - =1 if this is a multiple block OSP

- Format (Octet 0, Bits 4-0)
- identifies either Unconfirmed Data for MBT packets or an Alternate MBT format for trunking control:
 - =%10101 - Unconfirmed multiblock trunking control
 - =%10111 - Alternate multiblock trunking control



SAP Identifier (Octet 1, Bits 5-0)
- identifies the Service Access Point to which the data is directed. For the MBT, this may assume one of the following values:

SAP value	Description
61	non-Protected Trunking Control
63	Protected Trunking Control

Table 2.2-1 SAP Values For MBT Packet

Logical Link ID (Octets 3-5)
- identifies the identity to which this packet is directed. For the MBT, this references the Subscriber unit (SU) which sent the ISP or the SU to which the OSP is directed. (This may represent the Source Address, Source ID, Target Address, or Target ID as identified in Section 2.3.)

The Last Block of the MBT shall contain a CRC in the last four(4) octets (as defined in CAI, reference 1, section 6.3). Figure 2.2-2 illustrates the structure of the Last Block of the multiple block Trunking packet.

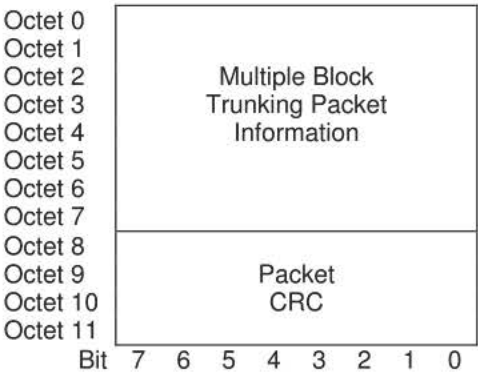


Figure 2.2-2 Multiple Block Trunking Packet Last Block Structure

2.3 Field Definitions

In addition to the preceding descriptions of general packet fields for the single and multiple block packet formats, are the following descriptions of packet fields which are common to a number of the trunking control channel packets.

SP-3-4661-RV2 TIA-102.AABC-B

2.3.1 Additional Information

The Additional Information field is used to include more descriptive information concerning the transaction. It shall be considered unique to the particular packet opcode to which it is being applied. The size of the Additional Information field is defined differently for each applicable control message, and varies between 3 and 4 octets.

2.3.2 Additional Information Valid Flag (AIV)

The AIV flag is used to indicate when the Additional Information field is to be considered valid. This flag is set to 1 if the Additional Information field is valid. Otherwise the information in the Additional Information field is to be ignored.

2.3.3 Announcement Group Address

This field denotes a special Group Address which addresses a grouping of Groups. This is unique within a System. (There needs to be some prior arrangement to associate the Groups to an Announcement Group Address.)

2.3.4 Answer Response

The Answer Response field will contain the response of the target unit user with regard to the pending call. Valid values are:

Value	Description
\$20	PROCEED
\$21	DENY
\$22	WAIT

Table 2.3.4-1 Answer Response Values

2.3.5 Base Frequency

This 32-bit field defines the absolute frequency which is to be used to determine the actual frequency value for a channel assignment as referenced by an Identifier. The frequency value (MHz) is computed as follows:

$$(\text{Base Frequency}) \times (0.000005 \text{ MHz})$$

Note: The Base Frequency value of zero is reserved and currently not valid.

2.3.6 BW

This 9-bit field specifies the anticipated channel bandwidth for this set of channels associated with an Identifier. The bandwidth (kHz) is computed as follows:

$$(BW) \times (0.125 \text{ kHz})$$

Note: The BW value of zero is reserved and currently not valid.

2.3.7 BW VU

The BW VU field takes on the following values for VHF/UHF receiver bandwidth.

%0000 - %0011	reserved
%0100	6.25 kHz receiver bandwidth
%0101	12.5 kHz receiver bandwidth
%0111 - %1111	reserved

Table 2.3.7-1 BW VU Values

2.3.8 Call Timer

The Call Timer field provides an indication of the allowed period of time that the call resource(s) are assigned to this call. This is measured in 100 ms intervals, with the range of 0.1 seconds to over 100 minutes, allowed values from \$0001 to \$FFFF. A value of \$0000 is to denote the Call timer is not provided. (This is an optional field, with \$0000 the default value.)

2.3.9 Channel

This field is used to identify the channel resource assigned for a specific service. This field is composed of two(2) sub-fields, 1) Channel Identifier, and 2) Channel Number.

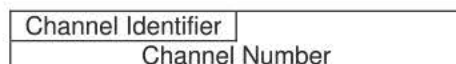


Figure 2.3.9-1 Channel Field

Note: This shall be assumed to represent the FNE transmit frequency for the channel. If a differentiation between transmit and receive channel values is required, then this shall be denoted as:

- Channel (R) - FNE receive channel component
- Channel (T) - FNE transmit channel component



SP-3-4661-RV2 TIA-102.AABC-B

2.3.9.1 Channel Identifier Field

The Channel Identifier field will determine the band of frequencies to associate with the following Channel Number value. There is a maximum of 16 unique channel identifier values per site. Each channel identifier shall be associated with a set of channel characteristics to include: base frequency, bandwidth, channel spacing, and transmit offset (if applicable). (See informative Annex F.)

A single system may support channel resources of more than one Channel Identifier type.

2.3.9.2 Channel Number Field

The Channel Number field will contain a value to be used to derive the actual frequency of the channel. The SU receive frequency is computed from the base frequency, channel spacing, and channel number as follows:

$$\text{SU RX} = (\text{Base Frequency}) + (\text{Channel Number}) \times (\text{Channel Spacing})$$

2.3.10 Channel Spacing

This 10-bit field defines what should be used as the frequency multiplier for the channel number specified in the channel field of the message formats associated with an Identifier value. The channel spacing (kHz) is computed as follows:

$$(\text{Channel Spacing}) \times (0.125 \text{ kHz})$$

Note:

The Channel Spacing value of zero is reserved and currently not valid.

2.3.11 Data Access Control (DAC)

This field allows for the RFSS to control packet data channel access for groups of MRC's for SNDCP services. This field is bit mapped to allow the implementation of up to 16 unique data access control groups. The MRC shall determine DAC group membership by using the Boolean logic "and" between the MRC's DAC field and the currently advertised DAC field in the DATA_CHN_ANN_EXP OSP. If the result is greater than 0, the MRC will check the AA and RA fields to determine access permission. The DAC field is given to MRC's during TDS Context Activation and must be included in all SN-DATA_CHN_REQ ISPs.

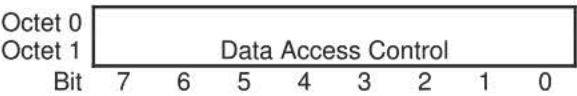


Figure 2.3.11-1 Data Access Control Field

2.3.12 Data Service Options

In general the data service requests and grants will allow for SMDCP data specific service extensions in the form of the data service options field. This allows great capability to tailor the requested service to the needs of the requesting entity or processing capability of the system.

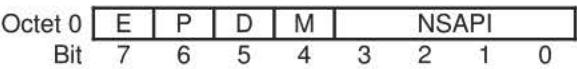


Figure 2.3.12-1 Data Service Options Field

- Bit 7 = Emergency This is the same as in the Service Options Field.
- Bit 6 = Protected This is the same as in the Service Options Field.
- Bit 5 = Duplex This is the same as in the Service Options Field.
- Bit 4 = Mode This is the same as in the Service Options Field.
- Bits 3-0 = NSAPI This field identifies the SMDCP Network Service Access Point ID (NSAPI) for a data service channel access request. This field shall be set to %0000 when requesting channel access for context activation.



SP-3-4661-RV2 TIA-102.AABC-B

2.3.13 Digit

The Digit field represent a telephone dialed digit or special dialing command. The following values for the Digit field are valid:

value	Definition	Escape Definition
%0000	DTMF '0'	DTMF 'A'
%0001	DTMF '1'	DTMF 'B'
%0010	DTMF '2'	DTMF 'C'
%0011	DTMF '3'	DTMF 'D'
%0100	DTMF '4'	<i>reserved</i>
%0101	DTMF '5'	<i>reserved</i>
%0110	DTMF '6'	<i>reserved</i>
%0111	DTMF '7'	<i>reserved</i>
%1000	DTMF '8'	<i>reserved</i>
%1001	DTMF '9'	<i>reserved</i>
%1010	DTMF '*'	<i>reserved</i>
%1011	DTMF '#'	<i>reserved</i>
%1100	<i>reserved</i>	<i>reserved</i>
%1101	hookflash	<i>reserved</i>
%1110	pause	<i>reserved</i>
%1111	<escape>	null

Table 2.3.13-1 Digit Values

Note: An <escape> digit preceding a digit value shall cause the set of <escape> and digit value to be interpreted as an Escape Definition per Table 2.3.13-1

2.3.14 Digit Count

The DIGIT COUNT field indicates the number of telephone digits to follow. This may assume a value of 1 to 34.

2.3.15 Extended Function

The Extended Function is a collection of related functions and operations. The Extended Function field is composed of the following subfields:

Class
Operand
Arguments

Figure 2.3.15-1 Extended Function Subfields

Class will determine the type of extended function to be considered.

Operand will determine the actual function being addressed based upon the Class designation.

Arguments will supply additional processing information. This may not be required for all extended functions, and will be set to "null" (0) if not required.



SP-3-4661-RV2 TIA-102.AABC-B

Class	Operand	Arguments	Description
\$00			Control command - unit:
\$00	\$00	Source Address	Radio check
\$00	\$01-\$7C	<i>reserved</i>	<i>reserved</i>
\$00	\$7D	Source Address	Radio Detach
\$00	\$7E	Source Address	Radio Uninhibit
\$00	\$7F	Source Address	Radio Inhibit
\$00	\$80	Source Address	Radio check ACK
\$00	\$81-\$FC	<i>reserved</i>	<i>reserved</i>
\$00	\$FD	Source Address	Radio Detach ACK
\$00	\$FE	Source Address	Radio Uninhibit ACK
\$00	\$FF	Source Address	Radio Inhibit ACK
\$01			Control command - group:
\$01	\$00-\$FF	<i>reserved</i>	<i>reserved</i>
\$02			Dynamic command - unit:
\$02	\$00-\$FF	<i>reserved</i>	<i>reserved</i>
\$03			Dynamic command - group:
\$03	\$00-\$FF	<i>reserved</i>	<i>reserved</i>
\$04			Tone Signaling Command - Unit
\$04	\$00-\$FF	<i>Reserved</i>	Tone Signal
\$05			Tone Signaling Command - Group
\$05	\$00-FF	Octets 0 and 1 Group Address Octet 2 reserved	Tone Signal
\$06-\$FF	\$00-\$FF	<i>reserved</i>	<i>reserved</i>

Table 2.3.15-1 Extended Function Values

2.3.16 Group Address

This field defines the 16-bit group identifier which uniquely defines a group within a System.

Value	Description
\$0000	null group
\$0001 - \$FFFE	assignable group (~64K)
\$FFFF	ALL group

Table 2.3.16-1 Group Address Values

Null group (\$0000)

This is a special group address to be used as a place holder in signaling formats expecting a group address, but where none actually applies for this particular application.

Assignable Group (\$0001 - \$FFFE)

This is the general address for use in group operations.

There are 65,534 unique group addresses supported for each communication system.

ALL group (\$FFFF)

This is a special group addressing to designate an ALL SYSTEM call. A call assignment with this group address will be processed by all the active units on the communication system (or segment of communication system), regardless of the individual unit's current group affiliations.

2.3.17 Group ID

This defines the 16-bit group identifier which together with the WACN ID and System ID uniquely defines a group.

2.3.18 Home System

The Home System is the system which contains a Home Location Register (HLR) that stores the identity information for one or more subscriber units. The subscriber units are said to be members of that home system. Subscriber units which roam into another system will use the identity of the home system to register. See reference [6] for details of registration.

2.3.19 Identifier

This 4-bit field is used to reference a particular set of frequencies of specified channel characteristics which will be used to determine actual frequency information. There are up to 16 unique channel set references allowed per control channel.

2.3.20 Location Registration Area (LRA)

This is a single octet. This defines the region of a Registration Area in which a subscriber unit may roam without the need to indicate a location update to the FNE. The Registration Area will typically consist of a number of LRAs. The LRA may be a single site or a collection of sites of an RFSS. The octet's exact meaning is a system design issue and explicit numerical assignments are to be made by the system designer.

SP-3-4661-RV2 TIA-102.AABC-B

2.3.21 Message

This 16-bit field is used to present short data message.

Message value	Description
\$0000 - \$EFFF	user definable
\$F000 - \$FFFF	system definable

Table 2.3.21-1 Message Values

2.3.22 Reason Code

This is an 8-bit vector which is used to convey detailed information for some transactions. Where appropriate, there is a set of global defined values for the reason code provided for specific transactions.

(Refer to normative Annexes A, B, and C for tables of Cancel, Denied Response, and Queued Response Reason Codes respectively.)

2.3.23 RF Sub-System ID

The 8-bit RF Sub-System (RFSS) ID field indicates the identity of the RF Subsystem. The RFSS ID is unique within a System.

2.3.24 Service Options

In general the service requests and service grants will allow for specific service extensions in the form of the Service Options field. This allows great flexibility to tailor the requested service to the needs of the requesting unit or process capability of the system.

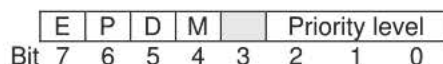


Figure 2.3.24-1 Service Options Field Definition

where:

Bit 7 = Emergency - this is the status indication to determine if this service is to be specially processed as an emergency service.

0 = Non-emergency indicates the normal processing status

1 = Emergency indicates special processing required.

- Bit 6 = Protected - indicates whether the resources (other than control channel resources) to be associated with this service should be presented in protected mode (e.g. encrypted) or not.
0 = not protected indicates normal mode presentation for the resource(s).
1 = protected indicates protection mode presentation for the resource(s).
- Bit 5 = Duplex - indicates the way the channel resource is to be utilized by the unit(s) involved in the call.
0 = Half duplex indicates the unit will be capable of transmitting but not simultaneously receiving on an assigned channel.
1 = Full duplex indicates the unit will be capable of simultaneous transmit and receive on an assigned channel.
- Bit 4 Mode - this is the indication of whether this service session should be accomplished in a packet mode or circuit mode.
0 = Circuit mode will utilize resources capable of supporting circuit operation.
1 = Packet mode will utilize resources capable of supporting packet operation.
- Bit 3 Reserved - currently set to null (0)
- Bits 2-0 = Priority level - indicates the relative importance attributed to this service

Value	Description
%111	Highest (top)
%110	<i>System definable</i>
%101	<i>System definable</i>
%100	default
%011	<i>System definable</i>
%010	<i>System definable</i>
%001	Lowest (bottom)
%000	<i>reserved</i>

Table 2.3.24-1 Priority Level Values

SP-3-4661-RV2 TIA-102.AABC-B

The following is the default minimum set of Service Options:

- non-emergency
- not protected
- half duplex
- circuit mode
- priority level= "default"

	E	P	D	M		Priority Level		
	0	0	0	0	0	1	0	0
Bit	7	6	5	4	3	2	1	0

Figure 2.3.24-2 Default Service Options Field Values

Other combinations of Service Options values may be viable and are a manufacturer's option.

2.3.25 Service Type

The 6-bit Service Type field indicates the service which is being identified. This is set equal to the appropriate "Opcode value" for the identified service.

2.3.26 Site ID

The 8-bit Site ID field indicates the identity of the site. The Site ID is unique within an RFSS.

2.3.27 Source Address

This field identifies the individual subscriber unit that originates or is responding to the transaction. It is equal to the working unit ID (WUID) of the originating subscriber unit. The WUID is assigned during registration and therefore may change when registration changes. This is a 24-bit vector that uniquely identifies the subscriber unit within the System. It shall utilize the Subscriber Unit Address as defined in this section.

2.3.28 Source ID

This is the 24-bit Unit ID portion of the Subscriber Unit ID (SUID) of the subscriber unit that originates or is responding to the transaction. The SUID is composed of the WACN ID and the System ID and the Unit ID. The SUID uniquely addresses a subscriber unit within the entire universe of subscriber units.

2.3.29 Status

This 16-bit field is parsed to present both Unit status and user status information.

Octet "s"	User status
Octet "s+1"	Unit Status

Figure 2.3.29-1 Status Field

User Status - the upper 8 bits of this 16-bit field refer to information pertinent to the user of the unit. This can include such things as the current job state, etc.

Status Value	DEFINITION
\$00 - \$EF	User definable
\$F0 - \$FF	<i>System definable</i>

Table 2.3.29-1 User Status Values

Unit Status - the lower 8 bits of this 16-bit field refer to information pertinent to the subscriber unit proper and not instigated by the user of the unit. This can include such things as the operational conditions of the unit or external monitor indications connected to the unit.

Status Value	DEFINITION
\$00 - \$EF	User definable
\$F0 - \$FF	<i>System definable</i>

Table 2.3.29-2 Unit Status Values

2.3.30 Subscriber Unit Address

The 24-bit Subscriber Unit Address will uniquely address a subscriber unit within the System.

Address value	Description
\$00 0000	No unit
\$00 0001 - \$FF FFFC	Assignable Unit
\$FF FFFD	System Default
\$FF FFFE	Registration Default
\$FF FFFF	ALL unit

Table 2.3.30-1 Subscriber Unit Values

No unit - this is a place holder for the subscriber unit address; it identifies no specific unit



SP-3-4661-RV2 TIA-102.AABC-B

Assignable Unit - these are the valid values to define a subscriber unit within a System

System Default - this is the special address to identify the FNE in general

Registration Default- this is the special address for a registration transaction prior to the subscriber unit receiving a valid unit address

ALL unit - this is the special address to identify all subscriber units

2.3.31 System ID

This is the 12-bit field to define the identity of the System.

2.3.32 System Service Class

The 8-bit System Service Class field indicates basics of what this channel will support. The defined values are:

- \$01 - composite control channel
- \$02 - no service requests; update control channel only
- \$04 - backup control channel only
- \$08 - reserved for future definition
- \$10 - data service requests only
- \$20 - voice service requests only
- \$40 - registration services only
- \$80 - authentication service only

These values may be ORed together to give different service class definitions. A few of the many possibilities are given below for examples. Other values not listed here are also allowed.

- \$00 - no services, either trunked or conventional
- \$F0 - all service, not a backup control channel

2.3.33 Target Address

This field identifies the individual subscriber unit that terminates or is to respond to the transaction. It is equal to the working unit ID (WUID) of the terminating subscriber unit. The WUID is assigned during registration and therefore may change when registration changes. This is a 24-bit vector that uniquely identifies the subscriber unit within the System. It shall utilize the Subscriber Unit Address as defined in this section.



2.3.34 Target ID

This is the 24-bit Unit ID portion of the Subscriber Unit ID (SUID) of the subscriber unit that terminates or is to respond to the transaction. The SUID is composed of the WACN ID and the System ID and the Unit ID. The SUID uniquely addresses a subscriber unit within the entire universe of subscriber units.

2.3.35 Transmit Offset

This 9-bit field specifies the relationship between the subscriber unit receive and transmit frequency for the channel (if such a relationship exists) associated with a particular Identifier. This field is further parsed as follows:

- b8- High/Low flag
 - 0 = SU transmit < SU receive;
 - 1 = SU transmit > SU receive
- b7-b0 - offset value

The transmit offset frequency (MHz) is computed as follows:

$$(\text{offset value}) \times (0.250\text{MHz})$$

If b8=0, this frequency is subtracted from the computed SU RX Frequency.

If b8=1, this frequency is added to the computed SU RX Frequency.

The result of the subtraction or addition is the SU TX frequency.

Note:

The value of \$00 is reserved to indicate that transmit and receive occur on the same frequency.

The value of \$80 is reserved to indicate that there is no standard transmit offset associated with this identifier. An explicit identifier to address the transmit frequency will need to be presented to the SU in any subsequent channel assignments.

2.3.36 Transmit Offset VU

This 14-bit field specifies the relationship between the subscriber unit receive and transmit frequencies for the channels (if such a relationship exists) associated with a particular VHF/UHF band Identifier.

The Transmit Offset VU field represents the separation from the subscriber receive frequency to the subscriber transmit frequency. The most significant bit takes the following values:

- %0 = SU transmit < SU receive frequency, Sign = -1
- %1 = SU transmit > SU receive frequency, Sign = +1



SP-3-4661-RV2 TIA-102.AABC-B

This field is parsed as follows:

- b13 - High/Low flag
 - 0 = SU transmit < SU receive frequency, Sign = -1
 - 1 = SU transmit > SU receive frequency, Sign = +1
- b12-b0 - offset value

The Transmit Offset VU is an integer that is multiplied by channel spacing to calculate the offset frequency.

2.3.37 WACN ID

This is the 20-bit field to define the network address.

2.3.38 Tone Signal

The definition of the 8-bit Tone Signal value is given in the table below:

Tone Signal Value	Tone Name
\$00	Emergency
\$01	Acknowledge
\$02	Message Alert
\$03	Channel Marker

Table 2.3.38 –1 Tone Signal Values

The tone descriptions, durations, and audio levels are defined in Reference 5.

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3.0 Categorization

The types of transactions to be supported in the Project 25 system are grouped as to their primary concern into one of three categories:

Voice Service - relates to those actions necessary to acquire, maintain, and release resources for the transfer of voice information (e.g. speech). Messages for voice service are defined in section 4.

Data Service - relates to those actions necessary to acquire, maintain, and release resources for the transfer of non-voice information (e.g. text data). Messages for data service are defined in section 5.

Control and Status Service - relates to those actions that cause some change of state of either the subscriber units or the fixed end. This generally does not require other than control channel resources. Messages for control and status services are defined in section 6.



SP-3-4661-RV2 TIA-102.AABC-B

4.0 Voice Service

This section defines the trunking control messages for voice services. These services include group calls, unit-to-unit calls, and telephone interconnect calls.

4.1 Voice Service ISPs

ISP	Alias	Opcode
Group voice service request	GRP_V_REQ	%000000
Unit to unit voice service request	UU_V_REQ	%000100
Unit to unit answer response	UU_ANS_RSP	%000101
Telephone interconnect request - explicit dialing	TELE_INT_DIAL_REQ	%001000
Telephone interconnect request - implicit dialing	TELE_INT_PSTN_REQ	%001001
Telephone Interconnect answer response	TELE_INT_ANS_RSP	%001010

Table 4.1-1 Voice Service ISPs



4.1.1 Group Voice Service Request (GRP_V_REQ)

This is the packet format to request voice service targeting a group audience. The group for the call, special conditions for the call, and identity of requesting unit are included in the service request.

Octet 0	LB	P	Opcode							
Octet 1	Manufacturer's ID									
Octet 2	Service Options									
Octet 3	reserved									
Octet 4										
Octet 5										
Octet 6	Group Address									
Octet 7	Source Address									
Octet 8										
Octet 9										
Octet 10	TSBK									
Octet 11	CRC									
Bit			7	6	5	4	3	2	1	0

Figure 4.1.1-1 Group Voice Service Request Format

The Opcode field (octet 0, bits 5-0) indicates this as a Group Voice Call Request, by assuming the value of %000000.



SP-3-4661-RV2 TIA-102.AABC-B

4.1.2 Unit To Unit Voice Service Request (UU_V_REQ)

This is the service request for a voice call between two specified SUs. The extended request format shall always be acceptable. The abbreviated request format is applicable only if the requesting SU is currently in its HOME system and the target SU is a member of the same HOME system (though it does not need to currently reside at the HOME system).

4.1.2.1 Abbreviated Format

This is the abbreviated packet form for the unit to unit request. This is used when the Source SU and the Target SU are members of the same Home system, and the Source SU resides in the Home system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Service Options							
Octet 3	<i>reserved</i>							
Octet 4	Target ID							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 4.1.2-1 Unit to Unit Voice Service Request - Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this as a Unit to Unit Voice Call Request, by assuming the value of %000100.



4.1.2.2 Extended Format

This is the packet format used for the unit to unit voice service request when the explicit address of the target unit must be conveyed.

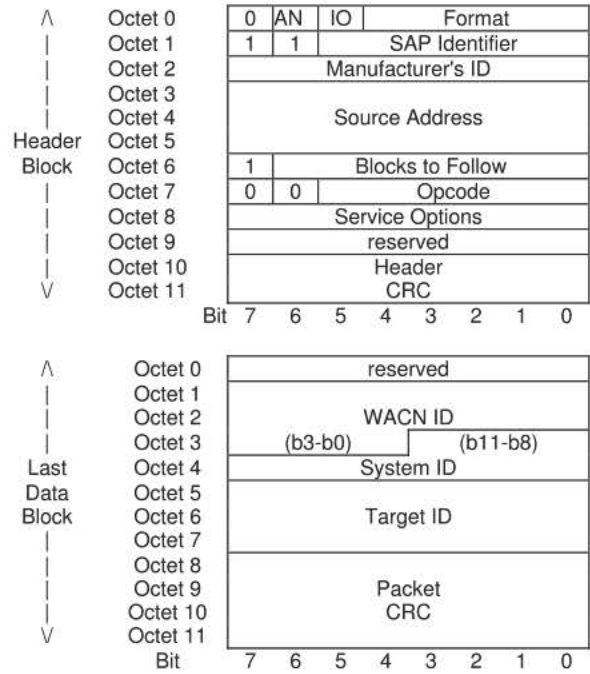


Figure 4.1.2-2 Unit to Unit Voice Service Request - Extended Format

- IO = %0 (ISP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001 (one data block after the Header Block)
- Opcode = %000100



SP-3-4661-RV2 TIA-102.AABC-B

4.1.3 Unit To Unit Voice Service Answer Response (UU_ANS_RSP)

This is the format to be used to accommodate the response of the called unit to the Unit to Unit Voice Service Answer Request. In the following packets, “Target” refers to the calling unit (initiator of the unit to unit call) and “Source” refers to the called unit.

4.1.3.1 Abbreviated Addressing Format

If the unit making this response is located in its HOME system AND both units are members of the same HOME system then this abbreviated format may be used with both the Target Address and Source Address referring to the HOME identities for these units.

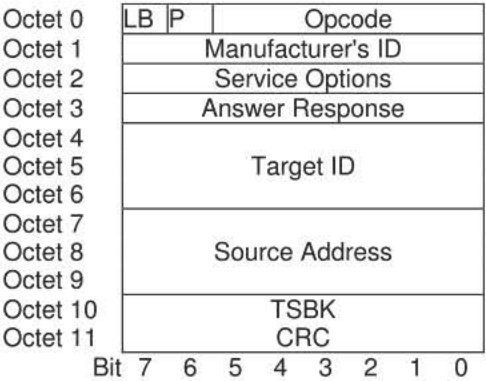


Figure 4.1.3-1 Unit to Unit Voice Service Answer Response Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this as a Unit to Unit Voice Answer Response, by assuming the value of %000101.



4.1.3.2 Extended Addressing Format

Whenever the abbreviated addressing format cannot be used, the extended addressing format shall be used.

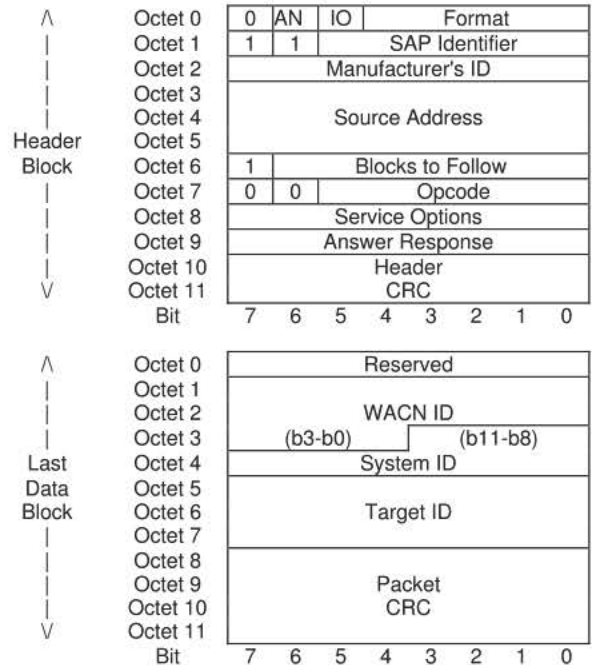


Figure 4.1.3-2 Unit to Unit Voice Service Answer Response Extended Format

IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001 (one data block after the Header Block)
Opcode = %000101



0%



SP-3-4661-RV2 TIA-102.AABC-B

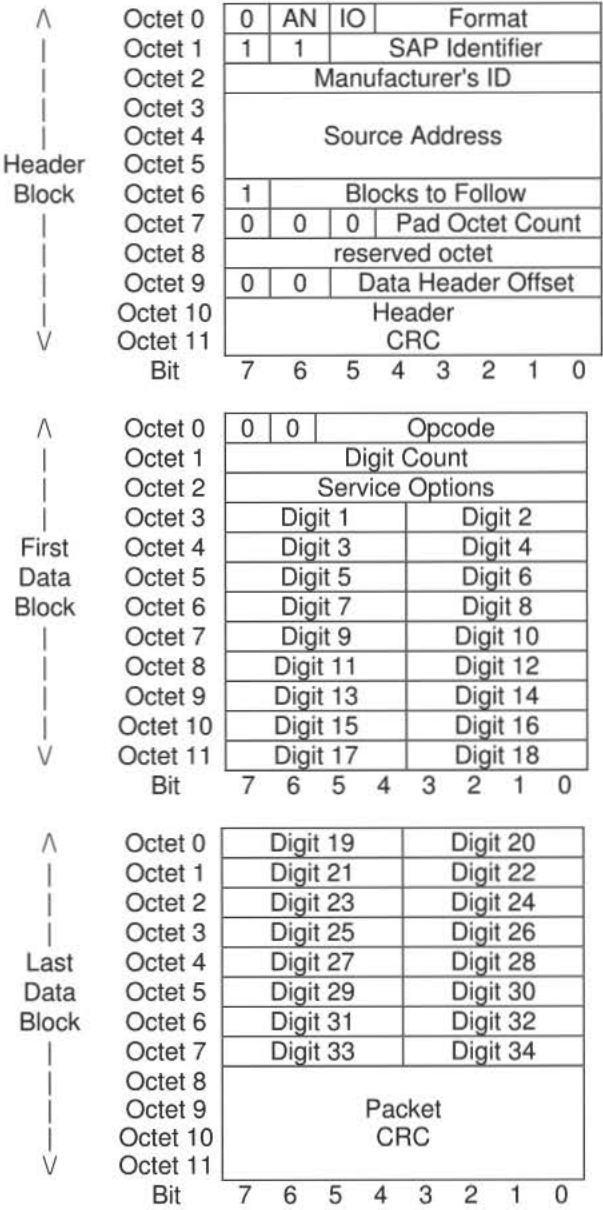


Figure 4.1.4-2 Explicit Dialing (>10 dialed digits)



SP-3-4661-RV2 TIA-102.AABC-B

Figure 4.1.4-1 depicts the transaction for telephone numbers up to 10 digits. The following field values apply:

IO	= %0 (ISP)
Format	= %10101 - Unconfirmed multiblock trunking control
Blocks to Follow	= %0000001 (one data block after the Header Block)
Pad Octet Count	= %00000 (no pads in the Data Block)
Data Header Offset	= %000000 (no Header in the Data Block)
Opcode	= %001000
Digit Count	- allowed values \$01 through \$0A (only 1 digit through 10 digit dialing)

Figure 4.1.4-2 depicts the transaction for telephone numbers between 11 and 34 digits. The following field values apply:

IO	= %0 (ISP)
Format	= %10101 - Unconfirmed multiblock trunking control
Blocks to Follow	= %0000010 (two data blocks after the Header Block)
Pad Octet Count	= %00000 (no pads in the Data Block)
Data Header Offset	= %000000 (no Header in the Data Block)
Opcode	= %001000
Digit Count	- allowed values \$01 through \$22 (1 digit through 34 digit dialing)

Unused digits may be set to %1111 which is the null digit value.



4.1.5 Telephone Interconnect Request-Implicit Dialing (TELE_INT_PSTN_REQ)

The single block packet structure format will be used when a PSTN address is used as the target address. Each PSTN address can be related to a unique dialing sequence. There is a unique set of PSTN addresses available to each unique unit identity.

Octet 0	LB	P	Opcode				
Octet 1	Manufacturer's ID						
Octet 2	Service Options						
Octet 3	reserved						
Octet 4	reserved						
Octet 5	reserved						
Octet 6	PSTN Address						
Octet 7	Source Address						
Octet 8							
Octet 9							
Octet 10	TSBK						
Octet 11	CRC						
Bit	7	6	5	4	3	2	1 0

Figure 4.1.5-1 Telephone Interconnect Request with PSTN Address

Opcode field (octet 0, bits 5-0) with the value %001001, indicates a telephone interconnect service request to use a predefined PSTN address as the target of this call.

PSTN Address field (Octet 6) is an 8-bit vector which indicates the special dialing value to reference for this call request. The value is associated with a dialing sequence. A set of these values may be globally defined across the System for every subscriber unit. Another set of values is unique for each subscriber unit.

PSTN address	Description
\$00	<i>reserved</i>
\$01 - \$7F	Unit defined
\$80- \$FF	<i>System definable</i>

Table 4.1.5-1 PSTN Address Descriptions



SP-3-4661-RV2 TIA-102.AABC-B

4.1.6 Telephone Interconnect Answer Response (TELE_INT_ANS_RSP)

This is the form of the ISP transaction from the target unit responding to the PSTN to unit answer request, to express the target user decision for this pending telephone call.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Service Options							
Octet 3	Answer Response							
Octet 4	<i>reserved</i>							
Octet 5	<i>reserved</i>							
Octet 6	<i>reserved</i>							
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 4.1.6-1 Telephone Interconnect Answer Response Format

The Opcode field (octet 0, bits 5-0) of the response packet indicates this is the PSTN to unit individual voice service, %001010.



4.2 Voice Service OSPs

OSP	Alias	Opcode
Group Voice Channel Grant	GRP_V_CH_GRANT	%000000
Group Voice Channel Grant Update	GRP_V_CH_GRANT_UPDT	%000010
Unit To Unit Voice Channel Grant	UU_V_CH_GRANT	%000100
Unit To Unit Answer Request	UU_ANS_REQ	%000101
Telephone Interconnect Voice Channel Grant	TELE_INT_CH_GRANT	%001000
Telephone Interconnect Answer Request	TELE_INT_ANS_REQ	%001010
Group Voice Channel Grant Update - Explicit	GRP_V_CH_GRANT_UPDT_EXP	%000011
Unit to Unit Voice Channel Grant Update	UU_V_CH_GRANT_UPDT	%000110
Telephone Interconnect Voice Channel Grant Update	TELE_INT_CH_GRANT_UPDT	%001001

Table 4.2-1 Voice Service OSPs

4.2.1 Group Voice Channel Grant (GRP_V_CH_GRANT)

4.2.1.1 Short Channel Form

This is the standard packet format to indicate that voice service for a group audience is assigned to specific channel resources of the system.

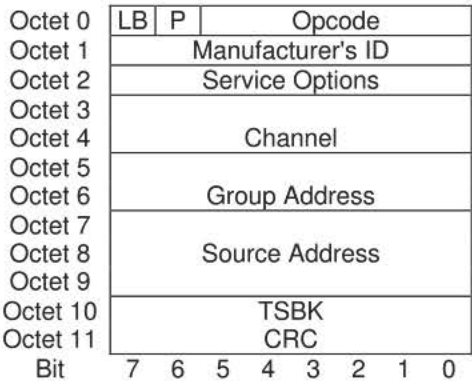


Figure 4.2.1-1 Group Voice Channel Grant - Short Channel Form



SP-3-4661-RV2 TIA-102.AABC-B

The Opcode field (octet 0, bits 5-0) , with a value of %000000, indicates this as a Group Voice Call Channel Grant.

4.2.1.2 Explicit Channel Form

This is the packet format when an explicit designation for the transmit and receive frequency values is required for the assigned working channel. This is accommodated with explicit channel fields for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency components.

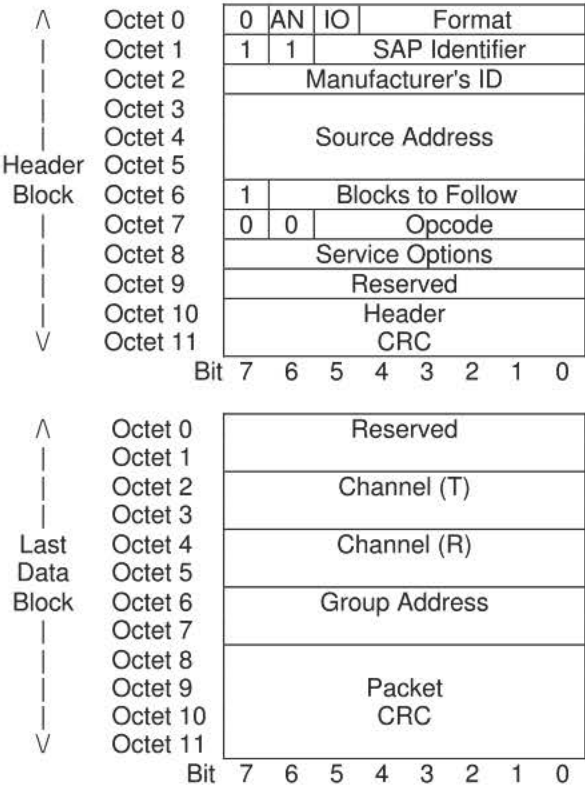


Figure 4.2.1-2 Group Voice Channel Grant - Explicit Channel Form

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001(one data block after the Header Block)

Opcode = %000000 (GRP_V_CH_GRANT)
Channel (T) = FNE transmit channel value
Channel (R) = FNE receive channel value

4.2.2 Group Voice Channel Grant Update (GRP_V_CH_GRANT_UPDT)

This packet may be used to present current group voice call activity channel grant updates on the outbound control channel. This format can present up to two(2) unique group voice channel assignments in the single packet. This packet is to be used only for updating members to the activity of the identified group upon the specified channel, but will not indicate any special characteristics of the group voice call (i.e. transmitting unit identity, call options, etc.) This information, if necessary in the update, requires the previous Group Voice Channel Grant packet format, or may be presented to the group members upon the specified working channel of the call. The message informs "late entry" units, i.e., those just entering the coverage area, or SUs just powering up, of the Group Calls in progress.

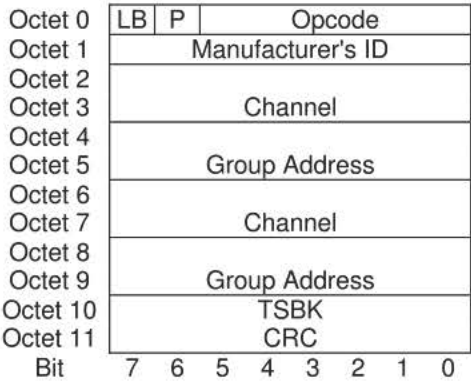


Figure 4.2.2-1 Group Voice Channel Grant Update

The Opcode field (octet 0, bits 5-0) , with a value of %000010, indicates this as a Group Voice Call Channel Grant Update.

NOTE:

The Channel in Octets 2-3 is to be associated with the Group Address in Octets 4-5.
The Channel in Octets 6-7 is to be associated with the Group Address in Octets 8-9.



SP-3-4661-RV2 TIA-102.AABC-B

4.2.3 Group Voice Channel Update-Explicit (GRP_V_CH_GRANT_UPDT_EXP)

This is the packet to present updates of current group voice call activity assigned to a working channel requiring explicit receive and transmit frequency designations. The message informs “late entry” units, i.e., those just entering the coverage area, or SUs just powering up, of the Group Calls in progress.

Octet 0	LB	P	Opcode				
Octet 1	Manufacturer's ID						
Octet 2	Service Options						
Octet 3	reserved						
Octet 4	Channel (T)						
Octet 5							
Octet 6	Channel (R)						
Octet 7							
Octet 8	Group Address						
Octet 9							
Octet 10	TSBK						
Octet 11	CRC						
Bit	7	6	5	4	3	2	1 0

Figure 4.2.3-1 Group Voice Channel Grant Update - Explicit Channel Form

The Opcode field (octet 0, bits 5-0) , with a value of %000011, indicates this as a Group Voice Call Channel Grant Update-explicit channel form.

Channel (T) designates the FNE transmit channel frequency.

Channel (R) designates the FNE receive channel frequency.

4.2.4 Unit to unit Answer Request (UU_ANS_REQ)

This is the packet to indicate to the target unit that a unit to unit call has been requested involving this target unit.

4.2.4.1 Abbreviated Addressing Format

If the unit making this request is located in its HOME system AND the unit being called is also a member of and located in the same HOME system as the calling unit, then this abbreviated format may be used with both the Target Address and Source ID referring to the HOME identities for these units.

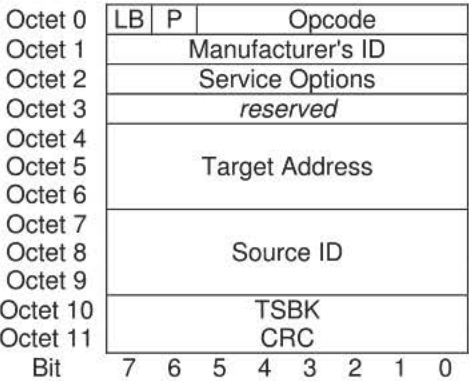


Figure 4.2.4-1 Unit to Unit Answer Request Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this as a Unit to Unit Answer Request, by assuming the value of %000101.



4.2.4.2 Extended Addressing Format

This format may be used any unit to unit answer request. Whenever the abbreviated addressing format cannot be used, this format shall be used.

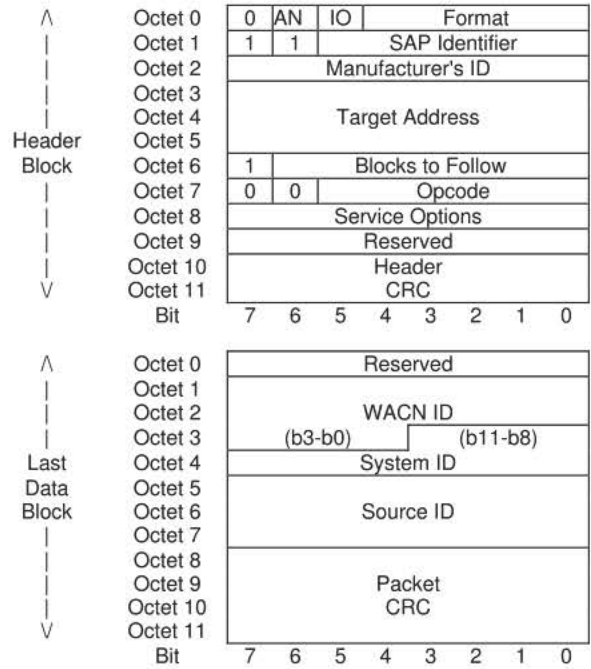


Figure 4.2.4-2 Unit to Unit Answer Request Extended Format

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001 (one data block after the Header Block)
Opcode = %000101



4.2.5 Unit to Unit Voice Service Channel Grant (UU_V_CH_GRANT)

4.2.5.1 Abbreviated Format

This is the transaction to indicate the particular channel assignment for a requested voice call between individual units of the system. This format is used when both the target and source unit are members of the same HOME system and currently are residing at this HOME system, AND the channel identifier implicitly indicates both the receive and transmit frequency values for the assigned channel. This format is used in all cases except where the transmit and receive channel identifiers are different. In all other cases the extended format of the UU_ANS_REQ provides the full Source ID.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Channel							
Octet 3								
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10								
Octet 11	TSBK CRC							
Bit	7	6	5	4	3	2	1	0

Figure 4.2.5-1 Unit to Unit Voice Service Channel Grant - Abbreviated Format

The Opcode field (octet 0, bits 5-0) , with a value of %000100, indicates this as a Unit to unit Voice Call Channel Grant.



SP-3-4661-RV2 TIA-102.AABC-B

4.2.5.2 Extended Format

This is the Unit to unit voice service channel grant packet format when the abbreviated format cannot be used.

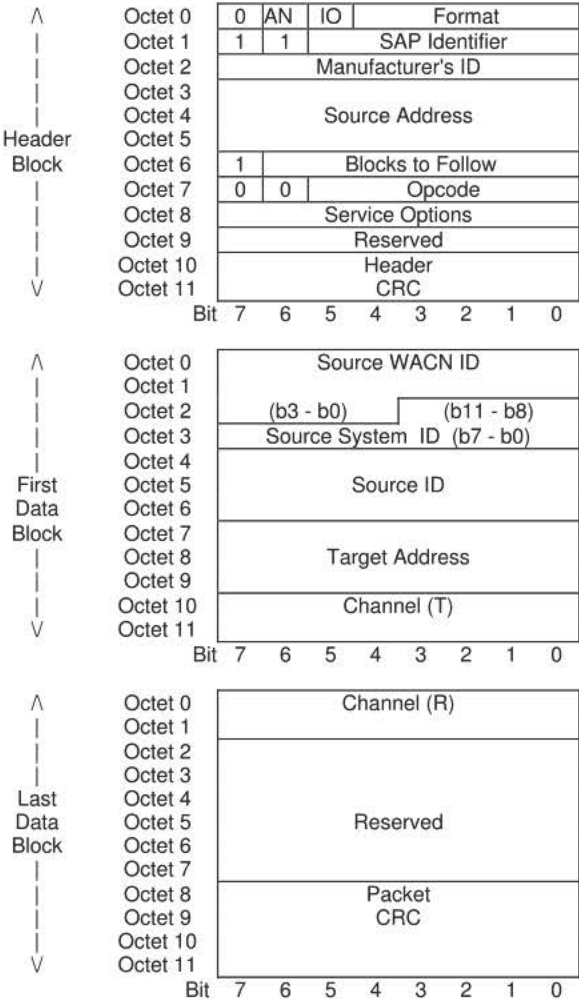


Figure 4.2.5-2 Unit to Unit Voice Channel Grant - Extended Format

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000010 (two data blocks after the Header Block)

Opcode = %000100 (UU_V_CH_GRANT)
Channel (T) = FNE transmit channel value
Channel (R) = FNE receive channel value

4.2.6 Telephone Interconnect Voice Channel Grant (TELE_INT_CH_GRANT)

4.2.6.1 Short Channel Form

This is the OSP format for the channel assignment for the requested telephone interconnect call.

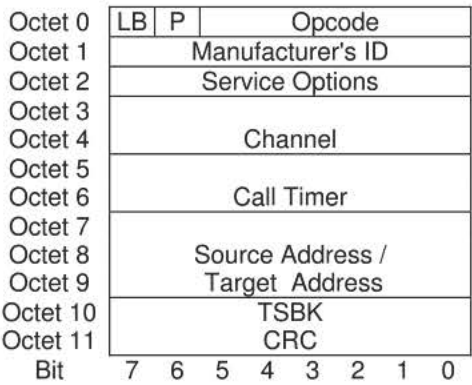


Figure 4.2.6-1 Telephone Interconnect Channel Grant - Short Channel Form

The Opcode field (octet 0, bits 5-0), with a value of %001000, indicates this as an Individual PSTN Voice Call Channel Grant.

NOTE:

If this is the grant in response to a PSTN initiated call to an SU, then the value in Octets 7-9 is the Target Address, otherwise this value is the Source Address.



4.2.6.2 Explicit Channel Form

This is the packet format when the assigned working channel requires a unique designation for the transmit and receive frequency values. This is accommodated with an explicit channel field for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency component.

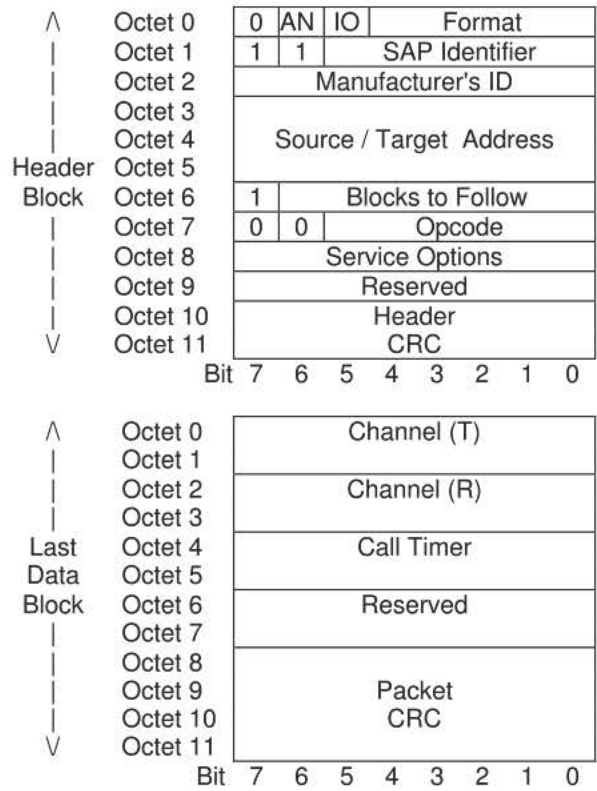


Figure 4.2.6-2 Telephone Interconnect Channel Grant - Explicit Channel Form

- IO = %1 (OSP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001(one data block after the Header Block)
- Opcode = %001000 (TELE_INT_CH_GRANT)
- Channel (T) = FNE transmit channel value
- Channel (R) = FNE receive channel value



4.2.7 Telephone Interconnect Answer Request (TELE_INT_ANS_REQ)

This is the OSP transaction which informs the target unit of a pending PSTN call and solicits a response from the target unit user. It may optionally indicate the identity of the calling party as a 10 digit telephone number in the Digit fields.

Octet 0	LB	P	Opcode							
Octet 1	Manufacturer's ID									
Octet 2	Digit 1				Digit 2					
Octet 3	Digit 3				Digit 4					
Octet 4	Digit 5				Digit 6					
Octet 5	Digit 7				Digit 8					
Octet 6	Digit 9				Digit 10					
Octet 7	Target Address									
Octet 8										
Octet 9										
Octet 10	TSBK									
Octet 11	CRC									
Bit	7	6	5	4	3	2	1	0		

Figure 4.2.7-1 Telephone Interconnect Answer Request Format

The Opcode field (octet 0, bits 5-0) indicates this as a PSTN to Unit Voice Answer Request, by assuming the value of %001010.



SP-3-4661-RV2 TIA-102.AABC-B

4.2.8 Unit to Unit Voice Channel Grant Update (UU_V_CH_GRANT_UPDT)

4.2.8.1 Abbreviated Format

This is the transaction to update the particular channel assignment for a requested voice call between individual units of the system. This format is used when both the target and source unit are members of the same HOME system and currently are residing at this HOME system, and the channel identifier implicitly indicates both the receive and transmit frequency values for the assigned channel.

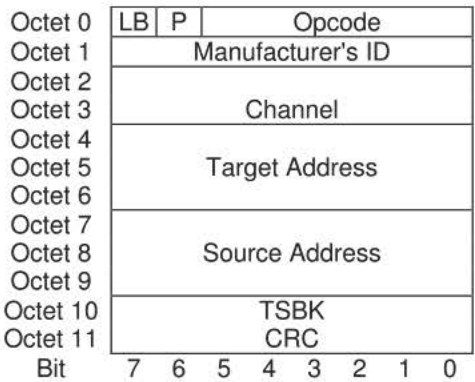


Figure 4.2.8-1 Unit to Unit Voice Channel Grant Update - Abbreviated Format

The Opcode field (octet 0, bits 5-0) , with a value of %000110, indicates this as a Unit to unit Voice Call Channel Grant.



4.2.8.2 Extended Format

This is the Unit to unit voice service channel grant update packet format when the abbreviated format cannot be used.

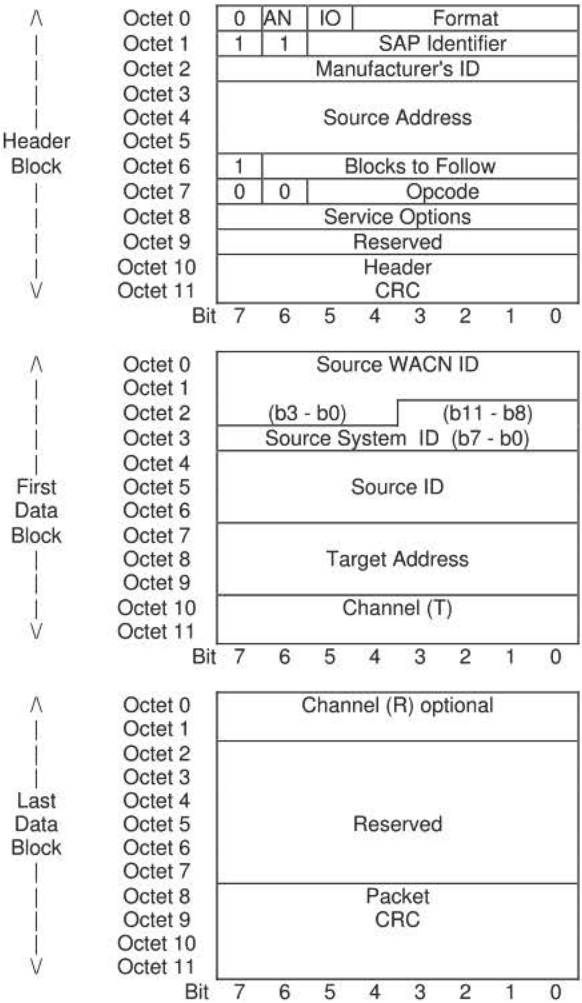


Figure 4.2.8-2 Unit to Unit Voice Channel Grant Update - Extended Format



SP-3-4661-RV2 TIA-102.AABC-B

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000010 (two data blocks after the Header Block)

Opcode = %000110 (UU_V_CH_GRANT_UPDT)
Channel (T) = FNE transmit channel value
Channel (R) = FNE receive channel value

4.2.9 Tel. Interconnect Channel Grant Update (TELE_INT_CH_GRANT_UPDT)

4.2.9.1 Short Channel Form

This is the OSP format for the channel grant update for a requested telephone interconnect call.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Service Options							
Octet 3	Channel							
Octet 4								
Octet 5	Call Timer							
Octet 6								
Octet 7	Source Address / Target Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 4.2.9-1 Tel. Interconnect Channel Grant Update - Short Channel Form

The Opcode field (octet 0, bits 5-0), with a value of %001001, indicates this as an Individual PSTN Voice Call Channel Grant Update.

NOTE:

If this is the update in response to a PSTN initiated call to an SU, then the value in Octets 7-9 is the Target Address, otherwise this value is the Source Address.

4.2.9.2 Explicit Channel Form

This is the packet format when the assigned working channel requires a unique designation for the transmit and receive frequency values. This is accommodated with an explicit channel field for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency component.

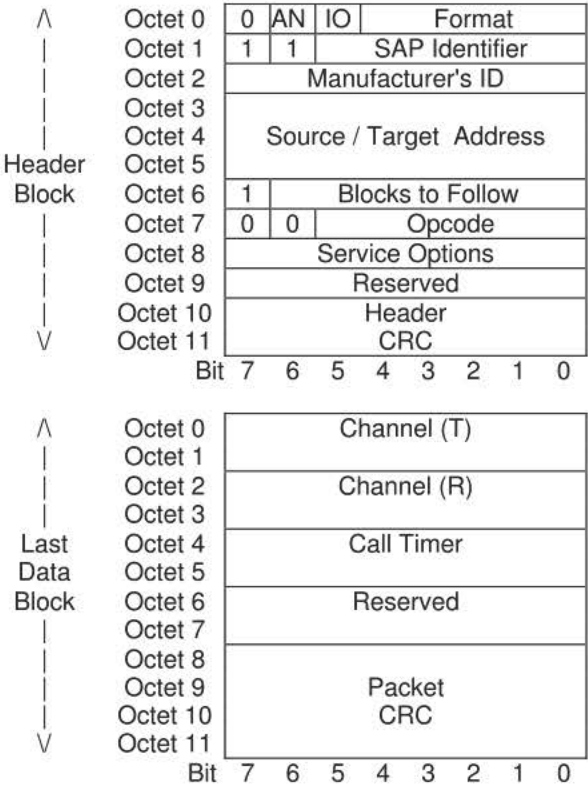


Figure 4.2.9-2 Tel. Interconnect Channel Grant Update - Explicit Channel Form

- IO = %1 (OSP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001(one data block after the Header Block)
- Opcode = %001001 (TELE_INT_CH_GRANT_UPDT)
- Channel (T) = FNE transmit channel value
- Channel (R) = FNE receive channel value



SP-3-4661-RV2 TIA-102.AABC-B

5.0 Data Service

This section lists trunking control messages for data services. These include individual and group data services.

5.1 Data Service ISPs

ISP	ALIAS	OPCODE
Individual Data Service Request (OBSOLETE)	IND_DATA_REQ	%010000
Group Data Service Request (OBSOLETE)	GRP_DATA_REQ	%010001
SNDCP Data Channel Request	SN-DATA_CHN_REQ	%010010
SNDCP Data Page Response	SN-DATA_PAGE_RES	%010011
SNDCP Reconnect Request	SN-REC_REQ	%010100

Table 5.1-1 Data Service ISPs



5.1.1 Individual Data Service Request (IND_DATA_REQ) - Obsolete

This message has been marked as obsolete and need not be considered in new designs.

This is the request format to initiate a data operation with some network device (fixed end equipment, or other radio unit).

5.1.1.1 Abbreviated Format

This format is used when both the target and source units are members of the same HOME system, and the source unit currently resides at that HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Service Options							
Octet 3	<i>reserved</i>							
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK CRC							
Octet 11								
Bit	7	6	5	4	3	2	1	0

Figure 5.1.1-1 Individual Data Service Request

The Opcode field (octet 0, bits 5-0) specifies this is the Data service request for Individual audience, %010000.



5.1.1.2 Extended Format

This format may be used for any Individual Data service request but shall be used when the abbreviated format is not appropriate.

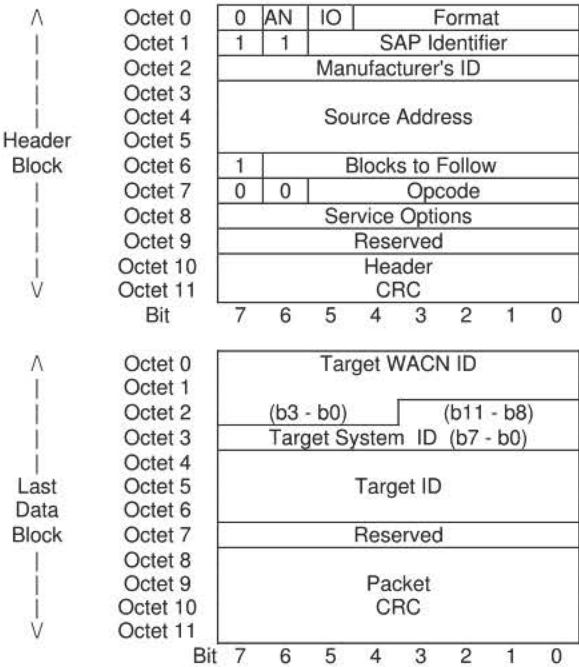


Figure 5.1.1-2 Individual Data Service Request - Extended Format

- IO = %0 (ISP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001 (one data block after the Header Block)
- Opcode = %010000



5.1.2 Group Data Service Request (GRP_DATA_REQ) – Obsolete

This message has been marked as obsolete and need not be considered in new designs

This is the request format to initiate a data operation with some group of subscriber units.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Service Options							
Octet 3	<i>reserved</i>							
Octet 4	<i>reserved</i>							
Octet 5	Group Address							
Octet 6								
Octet 7								
Octet 8	Source Address							
Octet 9								
Octet 10								
Octet 11	TSBK CRC							
Bit	7	6	5	4	3	2	1	0

Figure 5.1.2-1 Group Data Service Request

The Opcode field (octet 0, bits 5-0) specifies this is the Data service request for Group audience, %010001



5.1.3 SNDCP Data Channel Request (SN-DATA_CHN_REQ)

This TCCM is transmitted by the MRC on the inbound control channel when it has SNDCP data to send. The MRC will expect the FNE to transmit an SN-DATA_CHN_GNT in response to this TCCM on the outbound control channel.

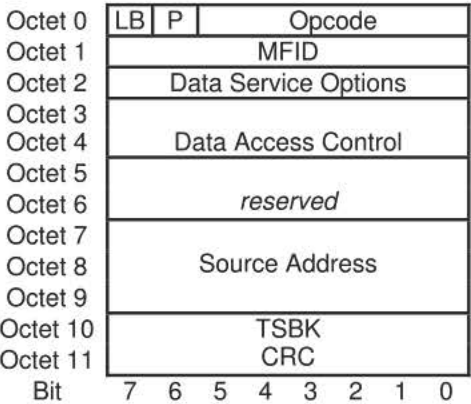


Figure 5.1.3-1 SNDCP Data Channel Request

The Opcode field (octet 0, bits 5-0) specifies this is the request for SNDCP data service, %010010.



5.1.4 SND CP Data Page Response (SN-DATA_PAGE_RES)

This is the TCCM sent by the MRC in response to an SN-DATA_PAGE_REQ received from the FNE. The MRC will respond with PROCEED, DENY, or WAIT as specified in the existing Answer Response field definition.

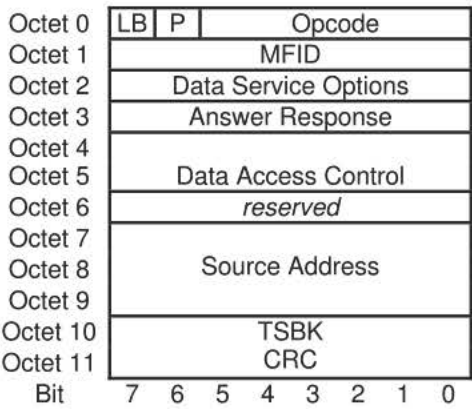


Figure 5.1.4-1 SND CP Data Page Response

The Opcode field (octet 0, bits 5-0) specifies this is the response to a SND CP data page, %010011.



5.1.5 SNDCP Reconnect Request (SN-REC_REQ)

This TCCM is transmitted by the MRC on the inbound control channel when it has successfully completed a location registration update while in the Ready State. If the MRC has SNDCP data in its buffers to send, it shall set the Data to Send (DS) field to %1, else it is set to %0. The MRC will expect the FNE to transmit an SN-DATA_CHN_GNT in response to this TCCM on the outbound control channel if the DS field has been set to %1.

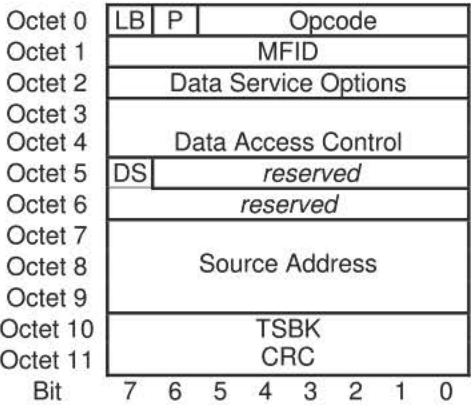


Figure 5.1.5-1 SNDCP Reconnect Request

The Opcode field (octet 0, bits 5-0) specifies this is the request for SNDCP data service reconnection, %010100.



SP-3-4661-RV2 TIA-102.AABC-B

5.2 Data Service OSPs

OSP	ALIAS	OPCODE
Individual Data Channel Grant (OBSOLETE)	IND_DATA_CH_GRANT	%010000
Group Data Channel Grant (OBSOLETE)	GRP_DATA_CH_GRANT	%010001
Group Data Channel Announcement (OBSOLETE)	GRP_DATA_CH_ANN	%010010
Group Data Channel Announcement Explicit (OBSOLETE)	GRP_DATA_CH_ANN_EXP	%010011
SND CP Data Channel Grant	SN-DATA_CHN_GNT	%010100
SND CP Data Page Request	SN-DATA_PAGE_REQ	%010101
SND CP Data Channel Announcement - Explicit	SN-DATA_CHN_ANN_EXP	%010110

Table 5.2-1 Data Service OSPs



SP-3-4661-RV2 TIA-102.AABC-B

5.2.1 Individual Data Channel Grant (IND_DATA_CH_GRANT)) - Obsolete

This message has been marked as obsolete and need not be considered in new designs.

5.2.1.1 Abbreviated Format

This is the grant (channel assignment) format for a data operation targeting an individual subscriber unit (or FNE address). This format may be used if both the target and source units are members of the same HOME system AND at least one of these units currently resides in the HOME system. *(If both units are not currently registered to the Home system, then an Extended Format message is needed to address this grant information to the unit not registered at the Home system.)*

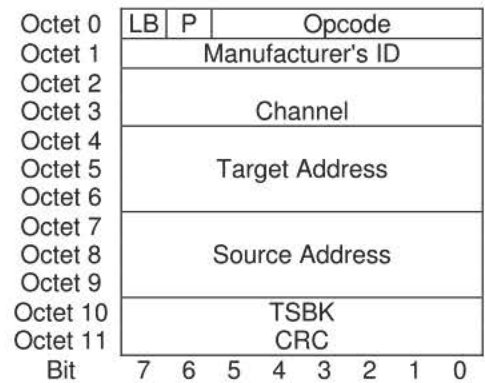


Figure 5.2.1-1 Individual Data Channel Grant - Abbreviated Format

The Opcode field (octet 0, bits 5-0) specifies this is the Data service channel grant for Group audience, %010000.



5.2.1.2 Extended Format

This format may be used for any individual data channel grant, but shall be used if the abbreviated format is not applicable.

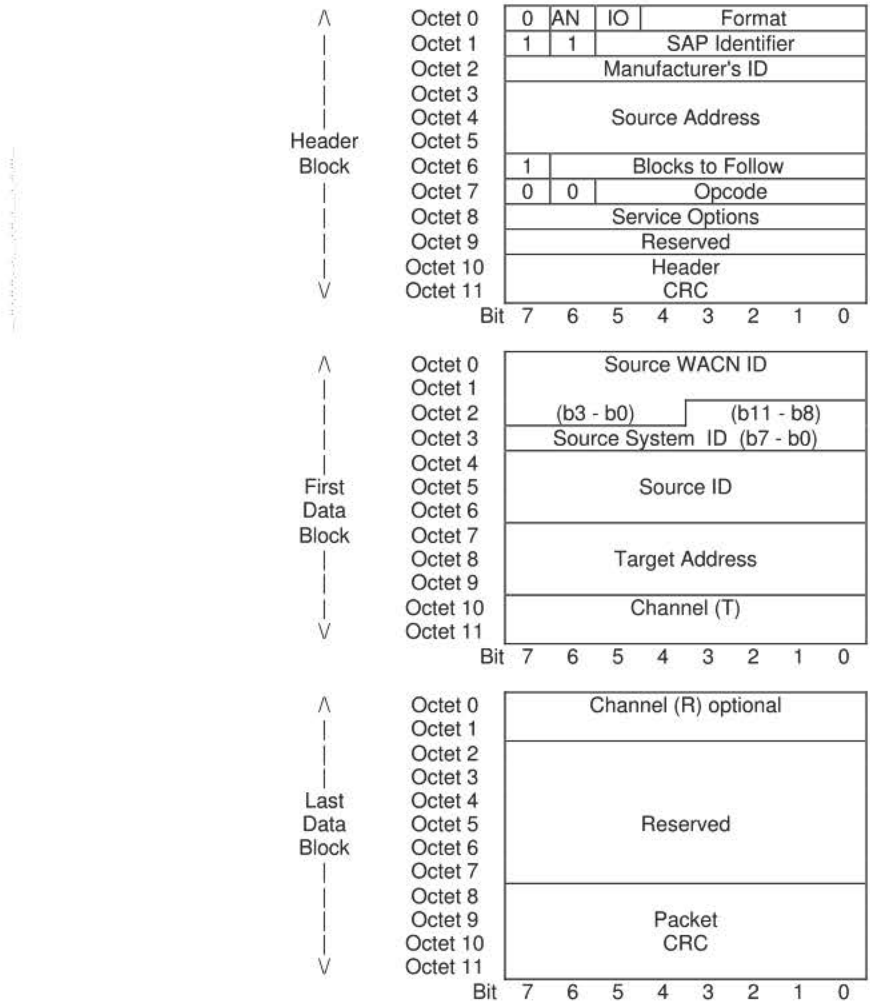


Figure 5.2.1-2 Unit to Unit Voice Channel Grant - Extended Format

SP-3-4661-RV2 TIA-102.AABC-B

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000010 (two data blocks after the Header Block)

Opcode = %010000 (IND_DATA_CH_GRANT)
Channel (T) = FNE transmit channel value
Channel (R) = FNE receive channel value

5.2.2 Group Data Channel Grant (GRP_DATA_CH_GRANT) - Obsolete

This message has been marked as obsolete and need not be considered in new designs.

5.2.2.1 Abbreviated Format

This is the grant (channel assignment) format for a data operation targeting a group of subscriber units.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Service Options							
Octet 3	Channel							
Octet 4								
Octet 5	Group Address							
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 5.2.2-1 Group Data Channel Grant - Abbreviated Format

The Opcode field (octet 0, bits 5-0) specifies this is the Data service channel grant for Group audience, %010001.



5.2.2.2 Extended Format

This is the packet format when the assigned working channel requires a unique designation for the transmit and receive frequency values. This is accommodated with an explicit channel field for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency component.

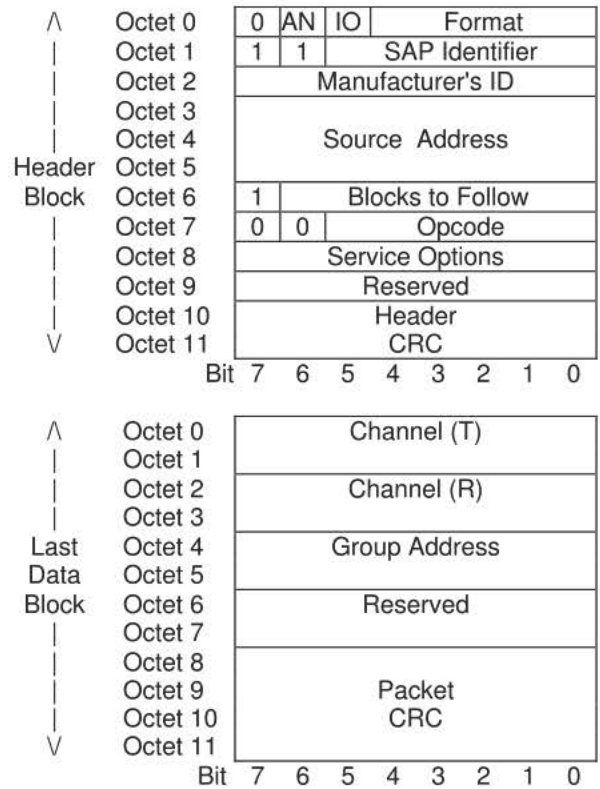


Figure 5.2.2-2 Group Data Channel Grant - Extended Format

- IO = %1 (OSP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001(one data block after the Header Block)
- Opcode = %010001 (GRP_DATA_CH_GRANT)
- Channel (T) = FNE transmit channel value
- Channel (R) = FNE receive channel value



SP-3-4661-RV2 TIA-102.AABC-B

5.2.3 Group Data Channel Announcement (GRP_DATA_CH_ANN) - Obsolete

This message has been marked as obsolete and need not be considered in new designs.

This announcement will indicate current working channel assignments for group Data service which may be utilized by subscriber units directly without the need of transacting a request for explicit resources for a data service.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Channel							
Octet 3								
Octet 4	Group Address							
Octet 5								
Octet 6	Channel							
Octet 7								
Octet 8	Group Address							
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 5.2.3-1 Group Data Channel Announcement

The Opcode field (octet 0, bits 5-0) specifies this is the Data Channel Announcement, %010010.

NOTE:

The Channel in Octets 2-3 is to be associated with the Group Address in Octets 4-5.
The Channel in Octets 6-7 is to be associated with the Group Address in Octets 8-9.

5.2.4 Group Data Channel Announcement,Explicit (GRP_DATA_CH_ANN_EXP) - Obsolete

This message has been marked as obsolete and need not be considered in new designs.

This announcement will indicate current working channel assignment for group Data service which may be utilized by subscriber units directly without the need of transacting a request for explicit resources for a data service.

This is the packet format when the assigned working channel requires a unique designation for the transmit and receive frequency values. This is accommodated with an explicit channel field for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency component.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Service Options							
Octet 3	Reserved							
Octet 4	Channel (T)							
Octet 5								
Octet 6	Channel (R)							
Octet 7								
Octet 8	Group Address							
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 5.2.4-1 Group Data Channel Announcement - Explicit

The Opcode field (octet 0, bits 5-0) , with a value of %010011, indicates this as a Group Voice Call Channel Grant Update-extended.

Channel (T) designates the FNE transmit channel frequency.

Channel (R) designates the FNE receive channel frequency.

5.2.5 SNDCP Data Channel Grant (SN-DATA_CHN_GNT)

This is the PDCH grant (channel assignment) in the standard TCCM format for an SNDCP trunked data service operation sent over the outbound trunking control channel from the FNE to the MRC. This may be sent in response to either an inbound SN-DATA_CHN_REQ or inbound SN_PAGE_RES TCCM. This is the packet format utilized when the assigned working PDCH requires a unique designation for transmit and receive frequency values. This is accommodated with an explicit channel field for the FNE transmit [Channel (T)], and FNE receive [Channel (R)] frequency component.

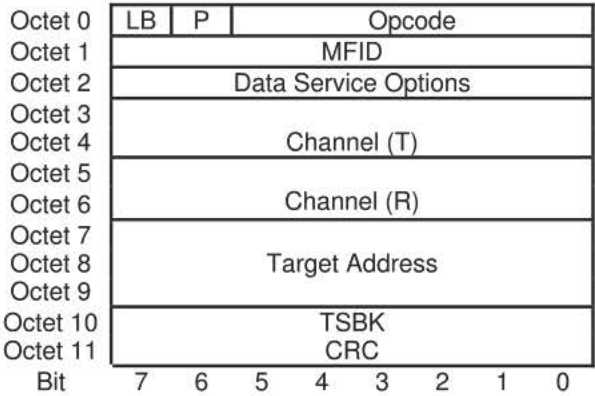


Figure 5.2.5-1 SNDCP Data Channel Grant

The Opcode field (octet 0, bits 5-0) specifies this is the SNDCP data channel grant, %010100.

5.2.6 SNDCP Data Page Request (SN-DATA_PAGE_REQ)

This is the TCCM used to indicate to the target MRC that trunked data service has been requested involving the included NSAPI. The FNE expects the target MRC to answer this request with the SN-DATA_PAGE_RES TCCM indicating if it is available to process this service.

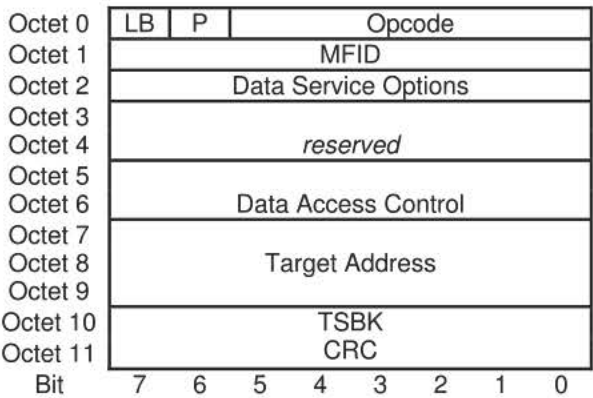


Figure 5.2.6-1 SNDCP Data Page Request

The Opcode field (octet 0, bits 5-0) specifies this is the SNDCP data page request, %010101.

5.2.7 SNDCP Data Channel Announcement - Explicit (SN-DATA_CHN_ANN_EXP)

This announcement will indicate current trunked data service working channel assignments and access permissions for the indicated data access control group(s). The RA and AA fields determine access permission for the indicated RF site and PDCH. If both AA and RA bits are set to %0, data service is currently not available for the indicated data access control group(s) at this RF site. This is the packet format when the assigned working PDCH requires a unique designation for transmit and receive frequency values. This is accommodated with an explicit channel field for the FNE transmit [Channel (T)], and FNE receive [Channel (R)] frequency component.

SP-3-4661-RV2 TIA-102.AABC-B

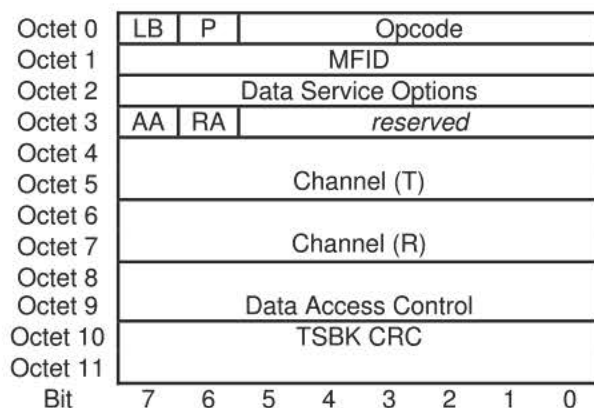


Figure 5.2.7-1 SND CP Data Channel Announcement - Explicit

Autonomous Access Trunked Data Service Availability (AA)

The Autonomous Access bit indicates if members of the advertised Data Access Control group are permitted to gain direct access to an announced PDCH without initiating a service request. If the AA field contains a value of %1, autonomous access for the indicated DAC group(s) is permitted. If the AA field contains a value of %0, autonomous access is not permitted. The only time the channel fields are valid is if the AA bit is set to %1.

Requested Access Trunked Data Service Availability (RA)

The Requested Access bit indicates if members of the advertised Data Access Control group are permitted to request access to a PDCH for trunked data service. If the RA field contains a value of %1, a request for data service is permitted for the indicated DAC group(s). If the RA field contains a value of %0, a request for data service is not permitted for the indicated DAC group(s).

The Opcode field (octet 0, bits 5-0) specifies this is the SND CP data channel announcement, %010110.



6.0 Control and Status Services

This section lists trunking control messages for general purpose control and status. These messages include various broadcast update messages as well as status, message, registration, de-registration, affiliation, authentication, and emergency messages.

6.1 Control and Status ISPs

ISP	ALIAS	OPCODE
Acknowledge Response - Unit	ACK_RSP_U	%100000
Authentication Query	AUTH_Q	%101110
Authentication Response	AUTH_RSP	%101111
Call Alert Request	CALL_ALRT_REQ	%011111
Cancel Service Request	CAN_SRV_REQ	%100011
Emergency Alarm Request	EMRG_ALRM_REQ	%100111
Extended Function Response	EXT_FNCT_RSP	%100100
Group Affiliation Query Response	GRP_AFF_Q_RSP	%101001
Group Affiliation Request	GRP_AFF_REQ	%101000
Identifier Update Request	IDEN_UP_REQ	%110010
Message Update Request	MSG_UPDT_REQ	%011100
Protection Parameter Request	P_PARM_REQ	%110000
Status Query Request	STS_Q_REQ	%011010
Status Query Response	STS_Q_RSP	%011001
Status Update Request	STS_UPDT_REQ	%011000
Unit Registration Request	U_REG_REQ	%101100
De-Registration Request	U_DE_REG_REQ	%101011
Location Registration Request	LOC_REG_REQ	%101101
Radio Unit Monitor Request	RAD_MON_REQ	%011101
Roaming Address Request	ROAM_ADDR_REQ	%110110
Roaming Address Response	ROAM_ADDR_RSP	%110111

Table 6.1-1 Control and Status ISPs



SP-3-4661-RV2 TIA-102.AABC-B

6.1.1 Acknowledge Response - Unit (ACK_RSP_U)

This is the generic response supplied by a unit to acknowledge an action when there is no other expected response.

6.1.1.1 Abbreviated Format

This is used if the source and target units are members of the same HOME system, AND the source unit currently resides in the HOME system.

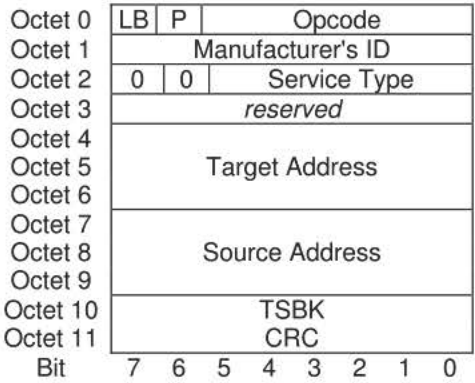


Figure 6.1.1-1 Acknowledge Response - Unit (Abbreviated Format)

The Opcode field (octet 0, bit 5-0) indicates the Acknowledge Response. This is set to %100000.



6.1.1.2 Extended Format

This format is always appropriate for an ACK_RSP_U, but shall be used when the abbreviated format is not applicable.

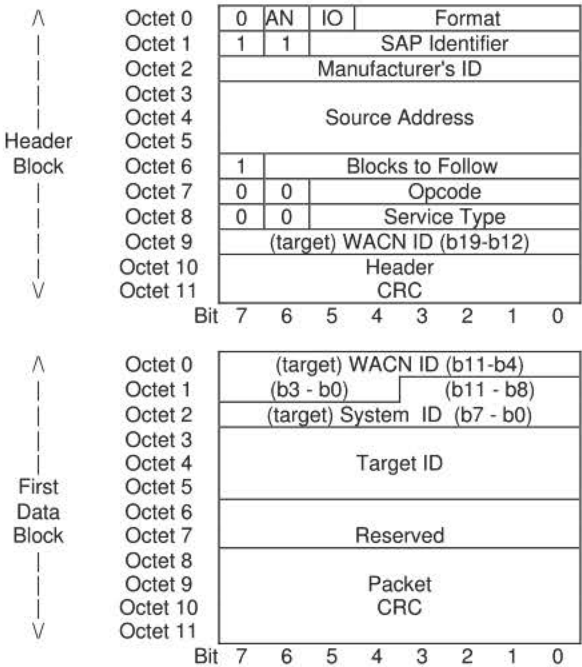


Figure 6.1.1-2 Acknowledge Response - Unit (Extended Format)

IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001 (one data block after the Header Block)
Opcode = %100000



SP-3-4661-RV2 TIA-102.AABC-B

6.1.2 Authentication Query (AUTH_Q)

This transaction is to be used to force an SU to initiate the Authentication process.

6.1.2.1 Abbreviated Format

This format may be used if both the source and target unit are members of the same HOME system, AND the source unit resides at the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	reserved							
Octet 3	reserved							
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.1.2-1 Authentication Query - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates this is the request for the target SU to perform Authentication. This is set to %101110.



6.1.2.2 Extended Format

This format may be used for any AUTH_Q transaction. This format shall be used when the abbreviated format is not applicable.

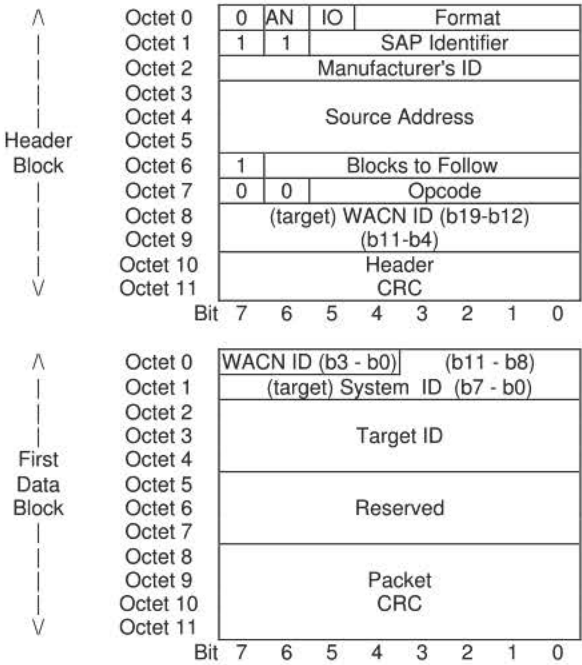


Figure 6.1.2-2 Authentication Query - Extended Format

IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001 (one data block after the Header Block)
Opcode = %101110



6.1.3 Authentication Response (AUTH_RSP)

This supplies a reply to an Authentication Query for this SU.

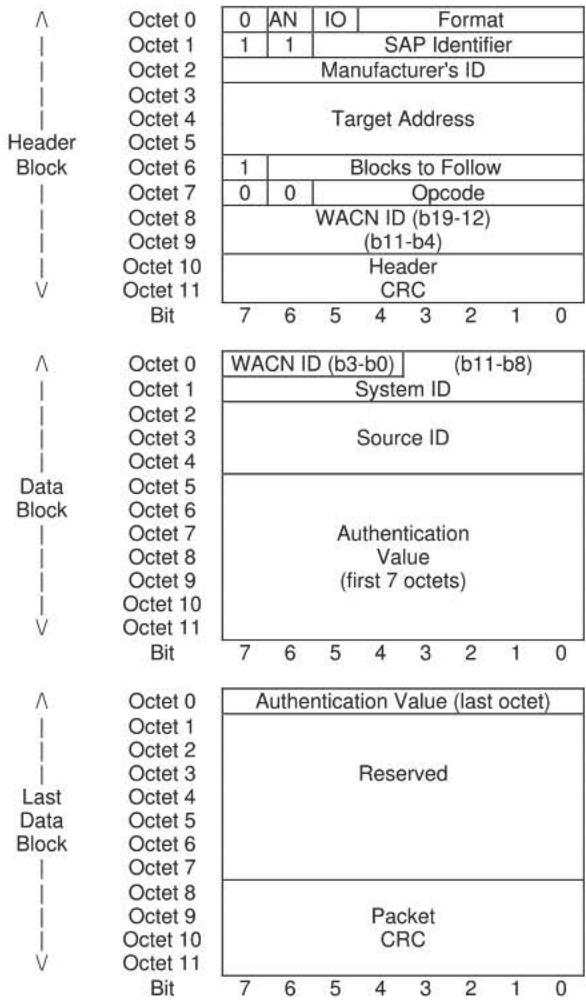


Figure 6.1.3-1 Authentication Response

- IO = %0 (ISP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000010 (two data blocks after the Header Block)
- Opcode = %101111
- Authentication Value - indicates the Electronic Serial Number for the Source SU.



6.1.4 Call Alert Request (CALL_ALRT_REQ)

This is the request for a target SU to call a source SU.

6.1.4.1 Abbreviated Format

This format may be used if the source and target units have the same HOME system, AND the source unit currently residing in the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	reserved							
Octet 3	reserved							
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.1.4-1 Call Alert Request - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates the Call Alert. This is set to %011111.



6.1.4.2 Extended Format

This format may be used for any CALL_ALERT_REQ. This format shall be used if the abbreviated format is not appropriate.

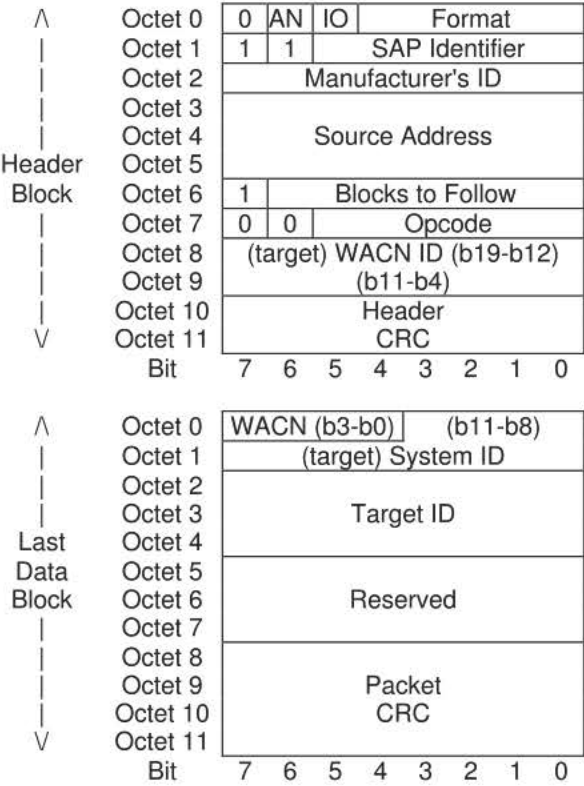


Figure 6.1.4-2 Call Alert Request - Extended Format

- IO = %0 (ISP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001 (one data block after the Header Block)
- Opcode = %0111111



6.1.5 Cancel Service Request (CAN_SRV_REQ)

This is the set of requests from the requesting unit to cancel any further actions with regard to the current (or indicated) service that has been initiated by this unit and is viable whether or not the indicated service is currently assigned to a channel resource.

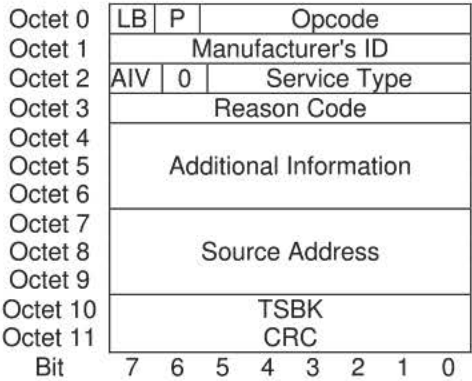


Figure 6.1.5-1 Cancel Service Request

The Opcode field (octet 0, bit 5-0) indicates the Cancel Service opcode, with a value of %100011.

Additional Information

If the service to be canceled is a Group audience service (Voice or Data), then this field will be populated as follows:

- octet 4 call options applied to this service
- octet 5,6 the 16-bit group address

If the service to be canceled is an Individual audience service (Voice or Data), then this field will be populated as follows:

- octet 4-6 the 24-bit address of the other member of the call

(Refer to normative Annex A for Cancel Reason Code table.)



6.1.6 Emergency Alarm Request (EMRG_ALARM_REQ)

This is a special status indication typically reserved for the "life threatening" situation.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	reserved							
Octet 3	reserved							
Octet 4	reserved							
Octet 5	Group Address							
Octet 6								
Octet 7								
Octet 8	Source Address							
Octet 9								
Octet 10								
Octet 11	TSBK CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.1.6-1 Emergency Alarm Request

The Opcode field (octet 0, bits 5-0) indicates this is the Emergency Alarm from an identified subscriber unit. This is set to the value of %100111.

6.1.7 Extended Function Response (EXT_FNCT_RSP)

This transaction is the response to an Extended Function command.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Extended Function							
Octet 3								
Octet 4								
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK CRC							
Octet 11								
Bit	7	6	5	4	3	2	1	0

Figure 6.1.7-1 Extended Function Command

The Opcode will indicate the Extended Function request, denoted as: %100100.



6.1.8 Group Affiliation Query Response (GRP_AFF_Q_RSP)

This is the response from a subscriber unit which has been queried for its current group affiliation data.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	E	<i>reserved</i>						
Octet 3	Announcement							
Octet 4	Group Address							
Octet 5	Group Address							
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.1.8-1 Group Affiliation Query Response

The Opcode field (octet 0, bit 5-0) indicates this is the response to a group affiliation query. This assumes the value of %101001.

The "E" (Emergency) bit is as defined in §2.3.24 Service Options.



SP-3-4661-RV2 TIA-102.AABC-B

6.1.9 Group Affiliation Request (GRP_AFF_REQ)

6.1.9.1 Abbreviated Format

This is the normal mode for an update of current group selection to the communication system. This is valid when the WACN ID of the Group (WACN ID:SYSTEM ID:GROUP ID) and the WACN ID of the current Site match.

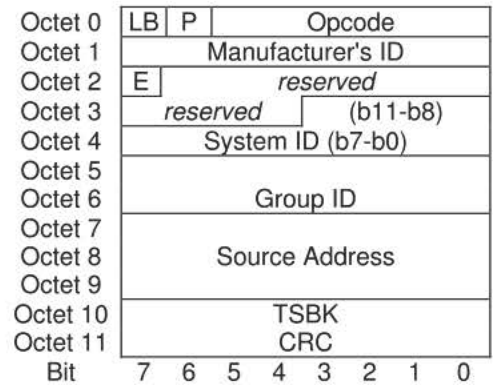


Figure 6.1.9-1 Group Affiliation Request - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates this is a request to associate specific group activity with this particular unit. This is set to %101000.

The "E" (Emergency) bit is as defined in §2.3.24 Service Options.



6.1.9.2 Extended Format

This format may be used for any group affiliation request. This format shall be used if the abbreviated format is not appropriate.

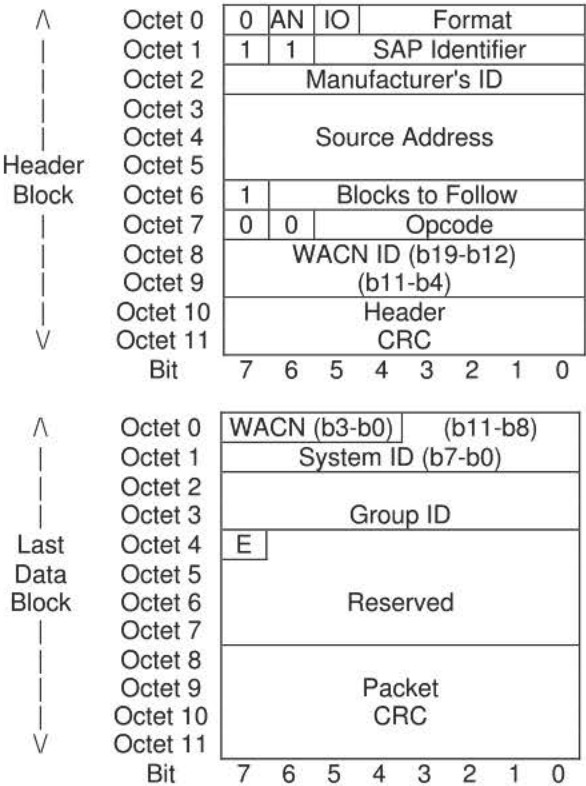


Figure 6.1.9-2 Group Affiliation Request - Extended Format

The "E" (Emergency) bit is as defined in §2.3.24 Service Options.

- IO = %0 (ISP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001(one data block after the Header Block)
- Opcode = %101000 (GRP_AFF_REQ)



SP-3-4661-RV2 TIA-102.AABC-B

6.1.10 Identifier Update Request (IDEN_UP_REQ)

This is the message format to allow a subscriber unit to request information concerning a specific identifier, or all current identifiers at this location.

Octet 0	LB	P	Opcode				
Octet 1	Manufacturer's ID						
Octet 2	Flags			Identifier			
Octet 3	<i>reserved</i>						
Octet 4							
Octet 5							
Octet 6							
Octet 7	Source Address						
Octet 8							
Octet 9							
Octet 10	TSBK						
Octet 11	CRC						
Bits	7	6	5	4	3	2	1 0

Figure 6.1.10-1 Identifier Update Request

The Flags field consists of 4 bits. The MSB (bit 7 of octet 2) indicates that all identifiers are requested to be broadcast, or to broadcast only the identifier value specified by the Identifier field. The value of "1" indicates that all identifiers are to be broadcast. Bits 6, 5, and 4 of octet 2 are reserved.

The Opcode field (octet 0, bit 5-0) indicates that this is a request for information on channel identifiers. This is set to %110010.



6.1.11 Message Update Request (MSG_UPDT_REQ)

This is the echo of the short data message from a subscriber unit when the destination of the message is another subscriber unit via control channel signaling.

6.1.11.1 Abbreviated Format

This format may be used when the Source unit is currently in its HOME system AND the target unit has this system as its HOME system.

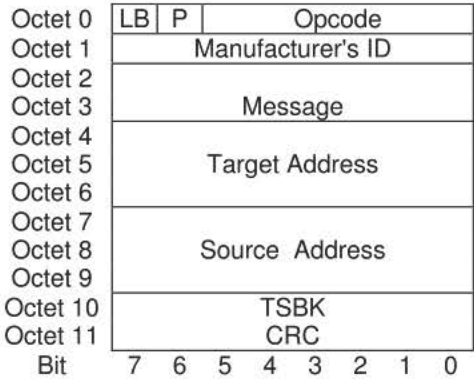


Figure 6.1.11-1 Message Update Request - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates this is short data message to the target SU. This is set to %011100.



6.1.11.2 Extended Format

This format may be used at any time for the Message Update request. This format shall be used when the abbreviated format is not appropriate.

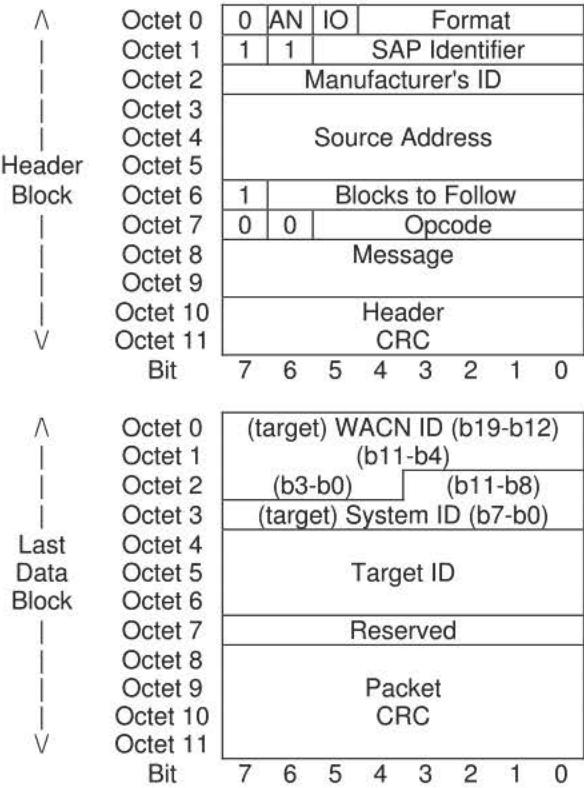


Figure 6.1.11-2 Message Update Request - Extended Format

IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001(one data block after the Header Block)
Opcode = %011100 (MSG_UPDT_REQ)



6.1.12 Protection Parameter Request (P_PARM_REQ)

This is the transaction used when a unit desires access to the protection parameters currently active for this control channel.

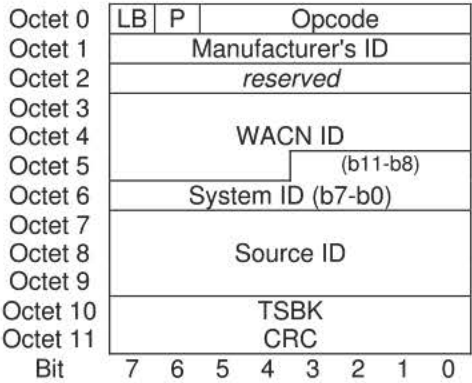


Figure 6.1.12-1 Protection Parameter Request

The Opcode field (octet 0, bit 5-0) indicates this is a Protection Parameter request transaction. This is denoted by the value %110000.



SP-3-4661-RV2 TIA-102.AABC-B

6.1.13 Status Query Request (STS_Q_REQ)

An appropriate unit may request the current user and unit status condition for a particular unit.

6.1.13.1 Abbreviated Format

This format may be used when the Source unit currently resides in its HOME system and the Target unit has this same system as its HOME system.

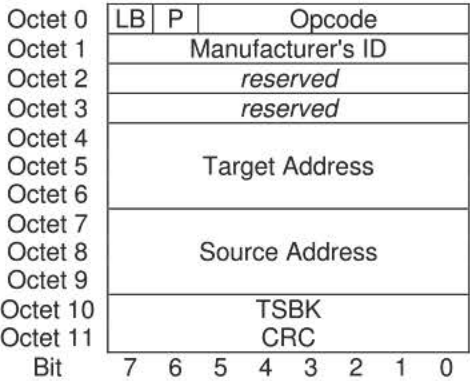


Figure 6.1.13-1 Status Query Request - Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this is the request for User Status update from an identified subscriber unit. This is set to the value of %011010.

6.1.13.2 Extended Format

This format may be used for any STS_Q_REQ. This format shall be used for a STS_Q_REQ if the abbreviated format is not appropriate.

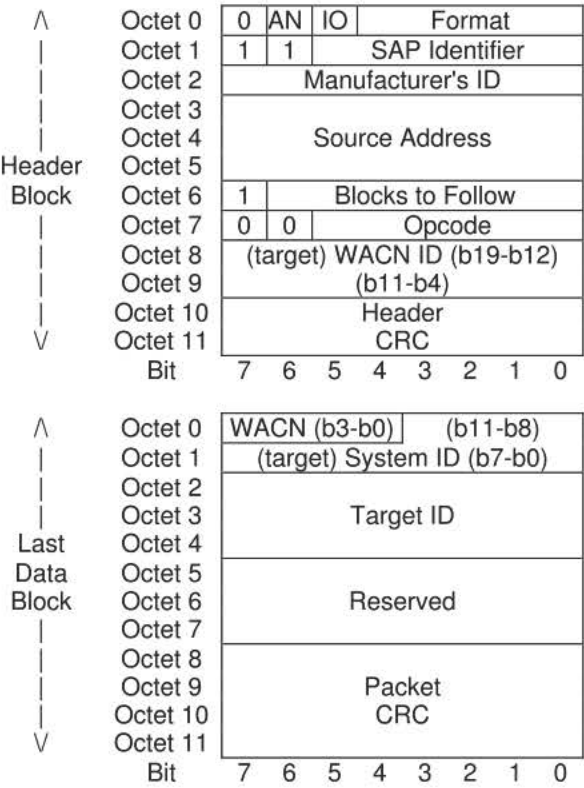


Figure 6.1.13-2 Status Query Request - Extended Format

- IO
- Format
- Blocks to Follow
- Opcode
- = %0 (ISP)
- = %10111 (alternate multiblock trunking control)
- = %0000001(one data block after the Header Block)
- = %011100 (STS_Q_REQ)



SP-3-4661-RV2 TIA-102.AABC-B

6.1.14 Status Query Response (STS_Q_RSP)

This is the response from a queried SU for its current status information. This will include both the current user status and the current unit status information in the Status field.

6.1.14.1 Abbreviated Format

This format of the STS_Q_RSP may be used if the Source unit and Target unit have the same HOME system designation, AND the Source unit currently resides at the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Status							
Octet 3								
Octet 4	Target Address							
Octet 5								
Octet 6	Source Address							
Octet 7								
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.1.14-1 Status Query Response - Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this is the Status update from an identified subscriber unit. This is set to the value of %011001.



6.1.14.2 Extended Format

This format may be used for the STS_Q_RSP. This format shall be used for the STS_Q_RSP if the abbreviated format is not appropriate.

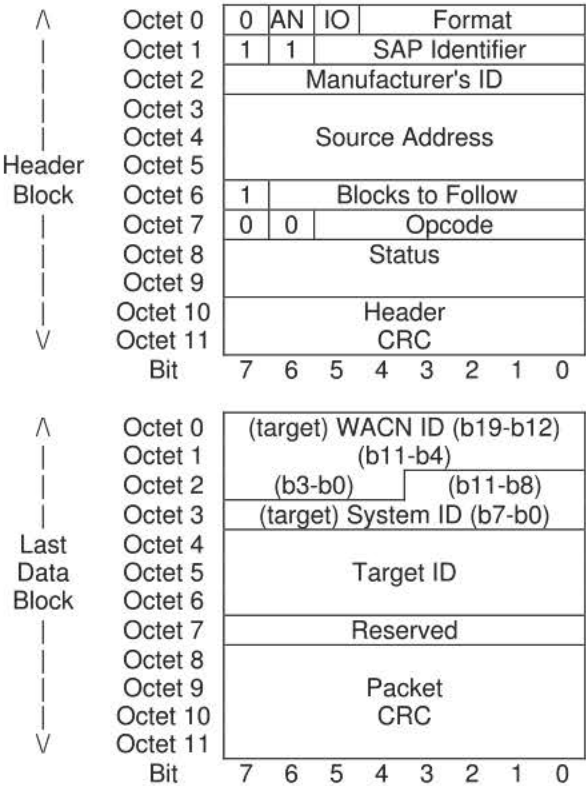


Figure 6.1.14-2 Status Query Response - Extended Format

IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001(one data block after the Header Block)
Opcode = %011001 (STS_Q_RSP)



SP-3-4661-RV2 TIA-102.AABC-B

6.1.15 Status Update Request (STS_UPDT_REQ)

This is used to indicate a status condition (User and Unit) for the Source SU to some Target address via the control channel.

6.1.15.1 Abbreviated Format

This format for the STS_UPDT_REQ may be used if both the Source and Target have the same HOME system designation, AND the Source unit currently resides in the HOME system.

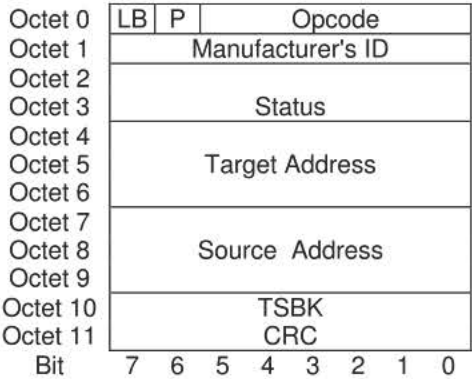


Figure 6.1.15-1 Status Update Request - Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this is the Status update from an identified subscriber unit. This is set to the value of %011000.



6.1.15.2 Extended Format

This format may be used to represent STS_UPDT_REQ. This format shall be used for a STS_UPDT_REQ if the abbreviated format is not appropriate.

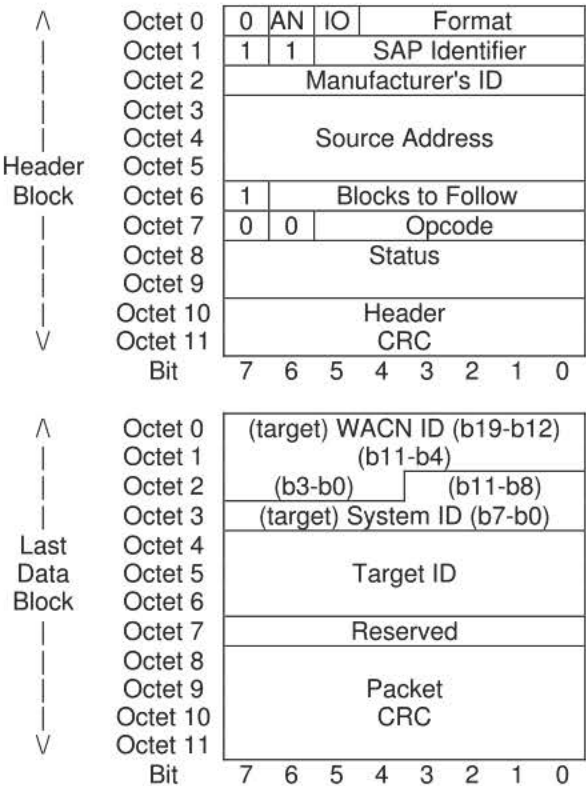


Figure 6.1.15-2 Status Update Request - Extended Format

IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001(one data block after the Header Block)
Opcode = %011000 (STS_UPDT_REQ)



SP-3-4661-RV2 TIA-102.AABC-B

6.1.16 Unit Registration Request (U_REG_REQ)

Once a unit has attained a valid system identity for the communication network, the unit will identify its presence in the communication system using this form.

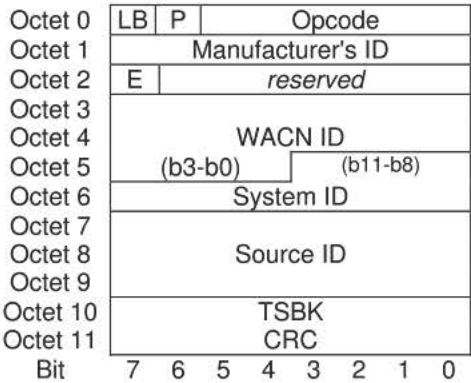


Figure 6.1.16-1 Unit Registration Request

The Opcode field (octet 0, bit 5-0) indicates this is a Unit Registration transaction. This is denoted by the value %101100.

The “E” (Emergency) bit is as defined in §2.3.24 Service Options.



6.1.17 De-Registration Request (U_DE_REG_REQ)

This transaction is to be used to request the de-registration of an SU in a system.

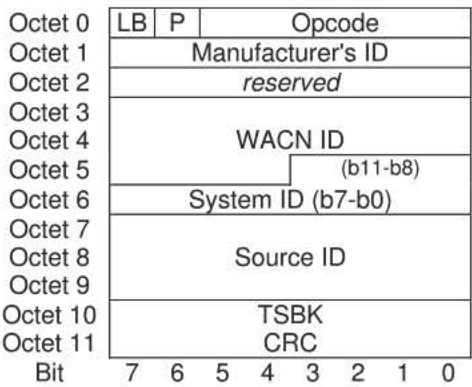


Figure 6.1.17-1 De-Registration Request

The Opcode field (octet 0, bit 5-0) indicates this is the de-registration request. This is set to %101011.



SP-3-4661-RV2 TIA-102.AABC-B

6.1.18 Location Registration Request (LOC_REG_REQ)

This transaction is to be used when a subscriber unit enters a new site within the same Location Registration Area of the previous site.

6.1.18.1 Abbreviated Format

This format for LOC_REG_REQ may be used to update registration at a new site in the Location Registration Area (LRA).

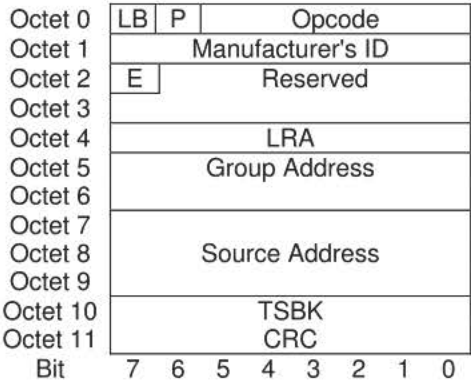


Figure 6.1.18-1 Location Registration Request - Abbreviated Format

The "E" (Emergency) bit is as defined in §2.3.24 Service Options.

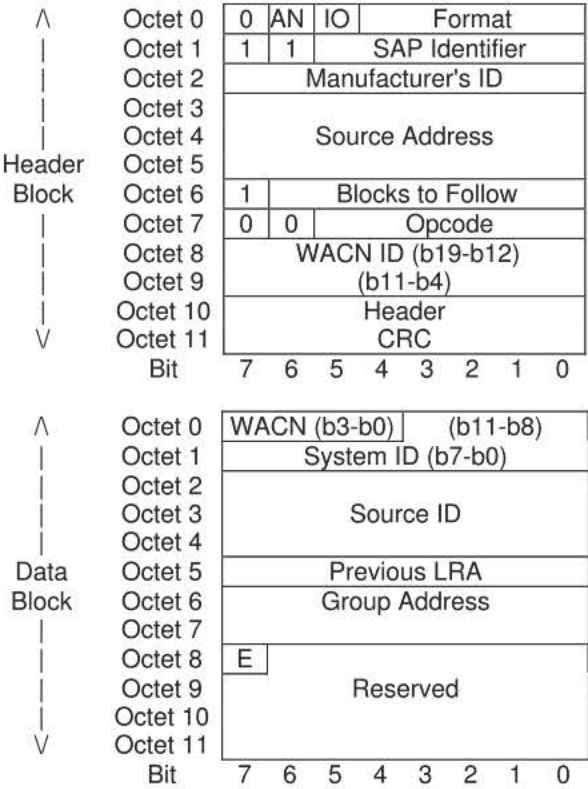
The LRA (octet 4) represents the Location Registration Area where the subscriber unit previously registered its identity. The LRA represents the location registration area at the site where the Group Address in octets 5-6, and the Source Address in octets 7-9 were previously defined.

The Opcode field (octet 0, bit 5-0) indicates this is the location registration request. This is set to %101101.



6.1.18.2 Extended Format

This format may be used to update registration at a new site in a new Location Registration Area (LRA).





SP-3-4661-RV2 TIA-102.AABC-B

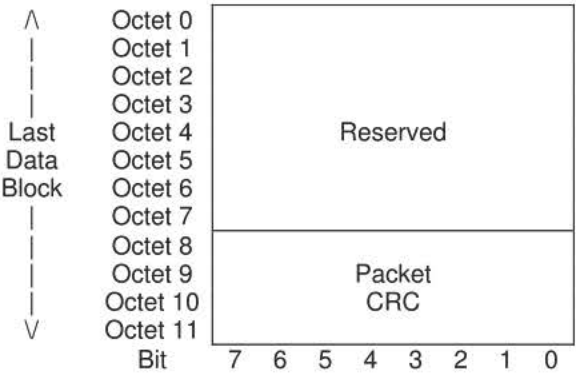


Figure 6.1.18-2 Location Registration Request - Extended Format

The “E” (Emergency) bit is as defined in §2.3.24 Service Options.
IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000010 (two data blocks after the Header Block)
Opcode = %101101 (LOC_REG_REQ)

6.1.19 Radio Unit Monitor Request (RAD_MON_REQ)

This transaction is to be used to request a radio unit monitor operation at another subscriber unit indicated by the target address.

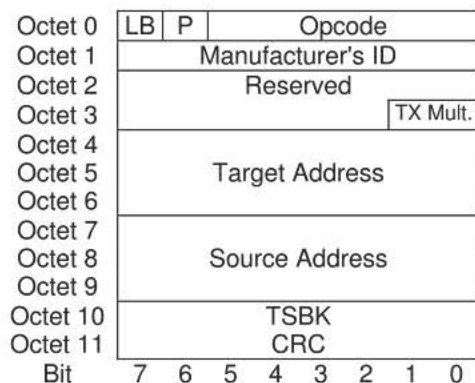


Figure 6.1.19-1 Radio Unit Monitor Request

The TX Multiplier (octet 3, bits 1,0) is a 2-bit value ranging from 0 to 3. It multiplies a stored value programmed in the target radio to represent the requested time to key the transmitter during the monitor function. The zero value does not cause the radio to key.

The Target Address (octets 4-6) is the address of the radio to be monitored. The Source Address (octets 7-9) is the address of the unit that wishes to monitor the target.

The Opcode field (octet 0, bit 5-0) indicates this is the radio unit monitor request. This is set to %011101.



6.1.20 Roaming Address Request (ROAM_ADDR_REQ)

This message is sent in by a source SU to query the RFSS for the roaming address stack contents of the target SU. This is the first step in the SU Read Operation for the Roaming Address Stack. There are two forms of this message. The first form is the abbreviated format. The second form is the extended format to include the full target address of the target SU.

6.1.20.1 Abbreviated Format

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	reserved							
Octet 3								
Octet 4								
Octet 5	Target Address							
Octet 6								
Octet 7								
Octet 8	Source Address							
Octet 9								
Octet 10								
Octet 11	TSBK CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.1.20-1 Roaming Address Request - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates this is the roaming address request. This is set to %110110.



6.1.20.2 Extended Format

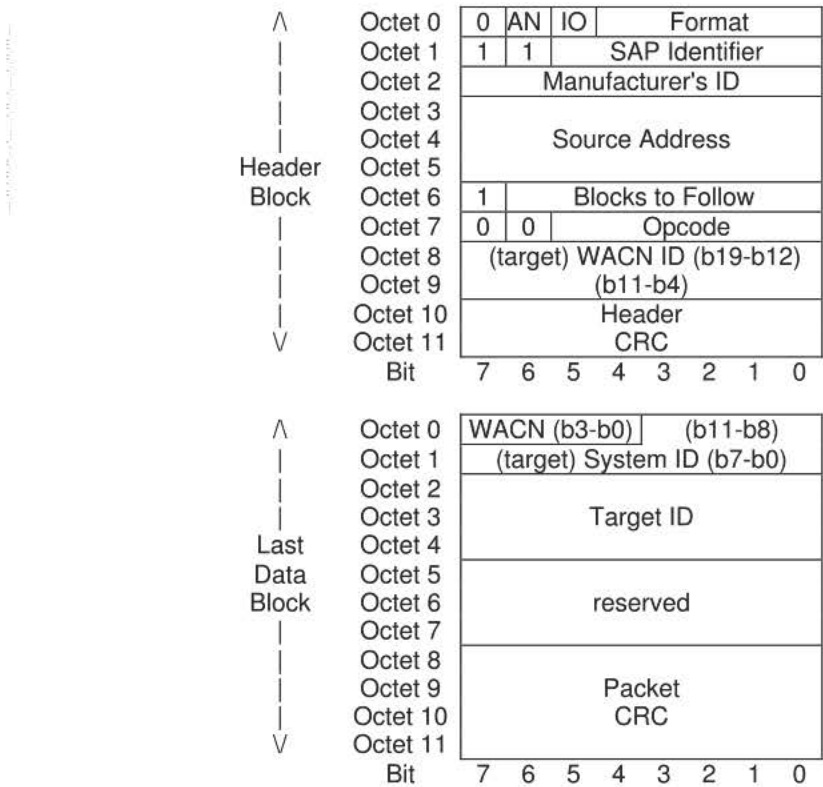


Figure 6.1.20-2 Roaming Address Request - Extended Format

IO = %0 (ISP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001(one data block after the Header Block)
Opcode = %110110 (ROAM_ADDR_REQ)



6.1.21 Roaming Address Response (ROAM_ADDR_RSP)

The Roaming Address Response is sent by the SU in a Read Operation. It contains the contents of the Roaming Address Stack. Four versions of this response are provided to convey up to 8 records of the stack. Any number of these messages may be sent consecutively to convey the contents of the stack.

6.1.21.1 Abbreviated Format

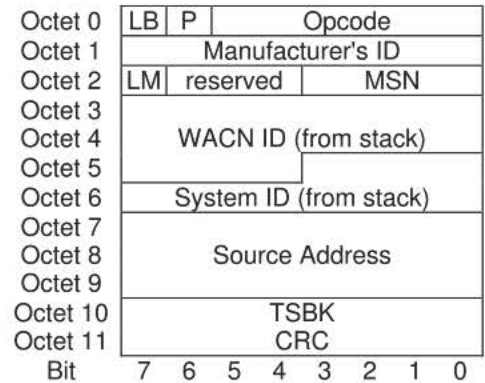


Figure 6.1.21-1 Roaming Address Response - Abbreviated Format

Opcode = %110111

- LM = Last Message. This is set to 1 to indicate last ROAM_ADDR_RSP message in a sequence. If there is only one ROAM_ADDR_RSP message, then LM is also set to 1. LM is cleared to 0 on any ROAM_ADDR_RSP message other than the last or only message.
- MSN = Message Sequence Number. This field is set to 0 for the first ROAM_ADDR_RSP message in a sequence, and is incremented for each subsequent message. If more than 16 messages are sent, the MSN is reset to 0 on the 17-th message, and then incremented for the 18-th and subsequent messages.



6.1.21.2 Extended Formats

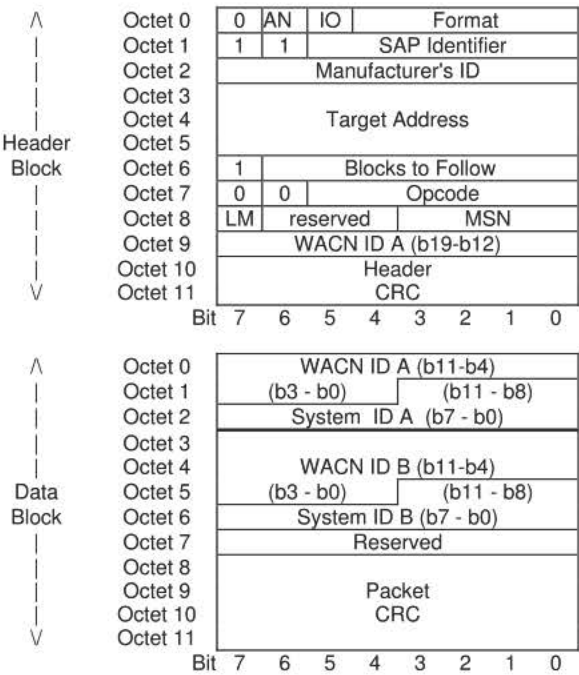


Figure 6.1.21-2 Roaming Address Response - Extended Format 1

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001 (one data block after the Header Block)
Opcode = %110111
LM = Last Message. This is set to 1 to indicate last ROAM_ADDR_RSP message in a sequence. If there is only one ROAM_ADDR_RSP message, then LM is also set to 1. LM is cleared to 0 on any ROAM_ADDR_RSP message other than the last or only message.
MSN = Message Sequence Number. This field is set to 0 for the first ROAM_ADDR_RSP message in a sequence, and is incremented for each subsequent message. If more than 16 messages are sent, the MSN is reset to 0 on the 17-th message, and then incremented for the 18-th and subsequent messages.



SP-3-4661-RV2 TIA-102.AABC-B

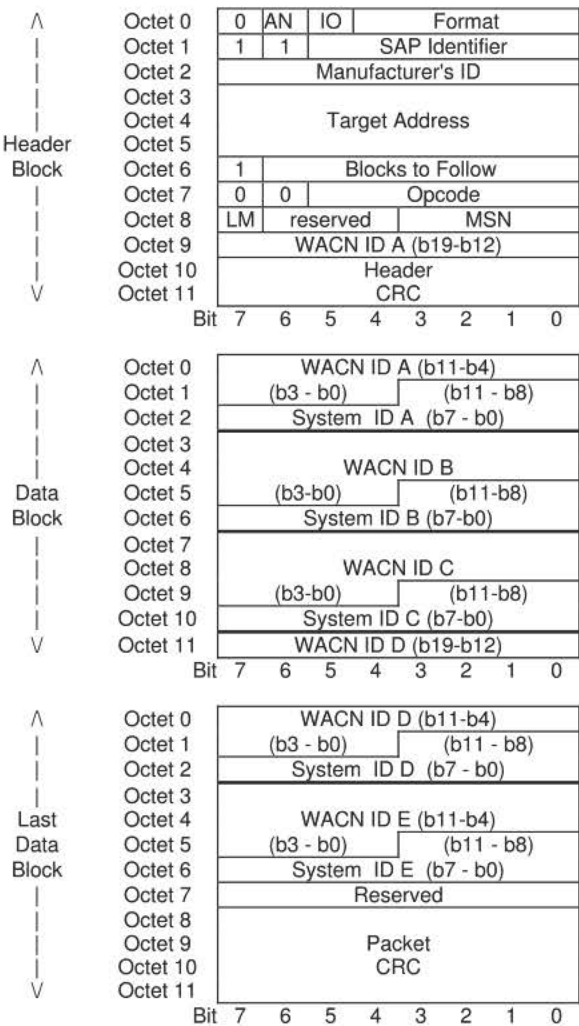


Figure 6.1.21-3 Roaming Address Response - Extended Format 2

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000010 (two data blocks after the Header Block)
Opcode = %110111

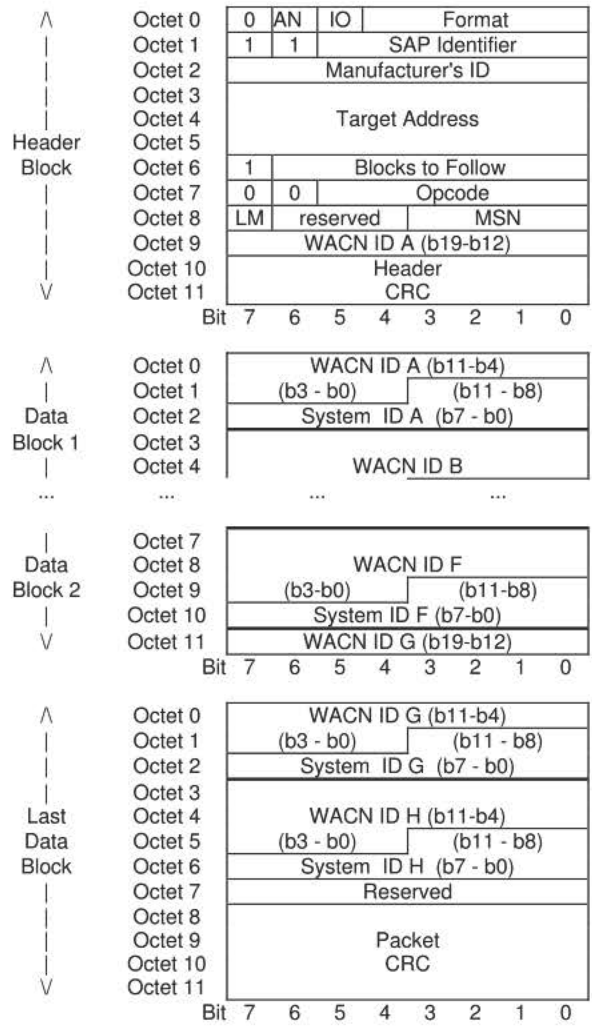


Figure 6.1.21-4 Roaming Address Response - Extended Format 3

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000011 (three data blocks after the Header Block)
Opcode = %110111



SP-3-4661-RV2 TIA-102.AABC-B

6.2 Control and Status OSPs

OSP	ALIAS	OPCODE
Acknowledge Response - FNE	ACK_RSP_FNE	%100000
Adjacent Status Broadcast	ADJ_STS_BCST	%111100
Authentication Command	AUTH_CMD	%101110
Call Alert	CALL_ALRT	%011111
Deny Response	DENY_RSP	%100111
Extended Function Command	EXT_FNCT_CMD	%100100
Group Affiliation Query	GRP_AFF_Q	%101010
Group Affiliation Response	GRP_AFF_RSP	%101000
Identifier Update	IDEN_UP	%111101
Message Update	MSG_UPDT	%011100
Network Status Broadcast	NET_STS_BCST	%111011
Protection Parameter Broadcast	P_PARM_BCST	%111110
Protection Parameter Update	P_PARM_UPDT	%111111
Queued Response	QUE_RSP	%100001
RFSS Status Broadcast	RFSS_STS_BCST	%111010
Secondary Control Channel Broadcast	SCCB	%111001
Status Query	STS_Q	%011010
Status Update	STS_UPDT	%011000
System Service Broadcast	SYS_SRV_BCST	%111000
Unit Registration Command	U_REG_CMD	%101101
Unit Registration Response	U_REG_RSP	%101100
De-Registration Ack.	U_DE_REG_ACK	%101111
Location Registration Resp.	LOC_REG_RSP	%101011
Radio Unit Monitor Command	RAD_MON_CMD	%011101
Roaming Address Command	ROAM_ADDR_CMD	%110110
Roaming Address Update	ROAM_ADDR_UPDT	%110111
Time and Date Announcement	TIME_DATE_ANN	%110101
Identifier Update for VHF/UHF Bands	IDEN_UP_VU	%110100
Secondary Control Channel Broadcast – Explicit	SCCB_EXP	%101001

Table 6.2-1 Control and Status OSPs

6.2.1 Acknowledge Response - FNE (ACK_RSP_FNE)

This is the generic response supplied to a unit to acknowledge an action when there is no other expected response.

This response is sent to a subscriber unit in response to an earlier action or service request.

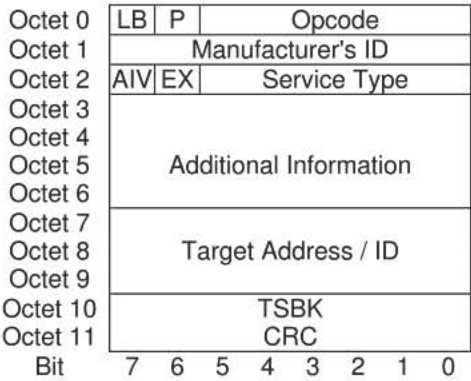


Figure 6.2.1-1 Acknowledge Response - FNE

The Opcode field (octet 0, bit 5-0) indicates the Acknowledge Response-FNE. This is set to %100000.

The AIV and EX flags determine the interpretation of the Additional Information in octets 3-6. AIV follows the definition of section 2.3.2. If AIV=1, then the interpretation depends on the EX (extended address) flag. If EX=1, then octets 3-6 contain the WACN ID and System ID for the target SU as shown in figure 6.2.1-2. If EX=0, then octets 3-6 contain a Source Address as shown in figure 6.2.1-3.

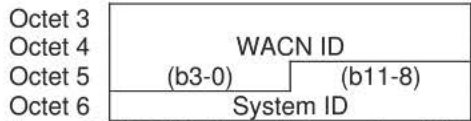


Figure 6.2.1-2 Additional Information (AIV=1, EX=1)

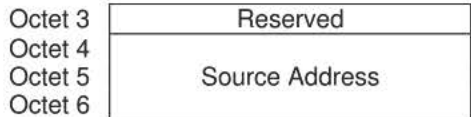


Figure 6.2.1-3 Additional Information (AIV=1, EX=0)

The Target Address is the normally assigned address of a target SU, when EX=0. If EX=1, the address is given by the Target ID instead.

6.2.2 Adjacent Status Broadcast (ADJ_STS_BCST)

This update will address not the current SITE associated with this control channel, but instead informs the subscriber unit of the presence and status of sites adjacent to this particular site. *At present this addresses only adjacent sites of the same WACN as this site.*

6.2.2.1 Abbreviated Format

The Abbreviated Format of the Adjacent Status Broadcast (ADJ_STS_BCST) is used when an explicit designation for the transmit and receive frequency values is not required for the frequency band being used (currently, non-VHF/UHF operations).

Octet 0	LB	P	Opcode				
Octet 1	Manufacturer's ID						
Octet 2	LRA						
Octet 3	C	F	V	A	(b11-b8)		
Octet 4	System ID (b7-b0)						
Octet 5	RF Sub-system ID						
Octet 6	Site ID						
Octet 7							
Octet 8	Channel						
Octet 9	System Service Class						
Octet 10	TSBK						
Octet 11	CRC						
Bit	7	6	5	4	3	2	1 0

Figure 6.2.2-1 Adjacent Status Broadcast

The OPCODE field (octet 0, bit 5-0) indicates this is an Adjacent status broadcast. This is denoted by the value %111100.

- The signaling bits in octet 3 have the following meaning.
- C (octet 3, bit 7) - This field will specify if the adjacent status broadcast is for a conventional channel. A value of 1 will indicate the adjacent broadcast is advertising a conventional channel.
 - F (octet 3, bit 6) - This field will specify if the site is in a failure condition. A value of 1 will indicate the site is in a failure condition.
 - V (octet 3, bit 5) - If the information contained in the adjacent status broadcast is known to be correct, this should be set to 1. If the site is not communicating with the

adjacent site, this should be set to 0. In the case of a 0 value, the data in the rest of the adjacent status broadcast will then be the last known correct data.

A (octet 3, bit 4) - This field will specify if the site has an active network connection with the RFSS controller, i.e., communication with other sites is possible. A value of 1 will indicate a valid RFSS network connection is active.

6.2.2.2 Extended Format

The Extended Format of the Adjacent Status Broadcast (ADJ_STS_BCST) is used when an explicit designation for the transmit and receive frequency values is required for the frequency band being used (currently, VHF/UHF operations). This is accommodated with explicit channel fields for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency components.

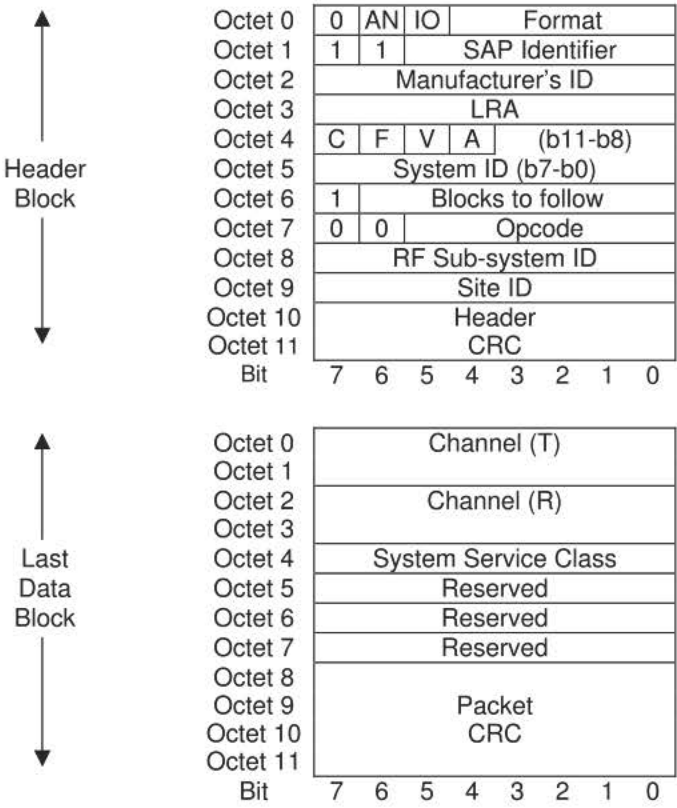


Figure 6.2.2-2 Adjacent Status Broadcast - Extended Format

IO = %1 (OSP)



SP-3-4661-RV2 TIA-102.AABC-B

Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001(one data block after the Header Block)
Opcode = %111100 (ADJ_STS_BCST)
Channel (T) = FNE transmit channel value
Channel (R) = FNE receive channel value

6.2.3 Authentication Command (AUTH_CMD)

This transaction is to be used to force an SU to initiate the Authentication process.

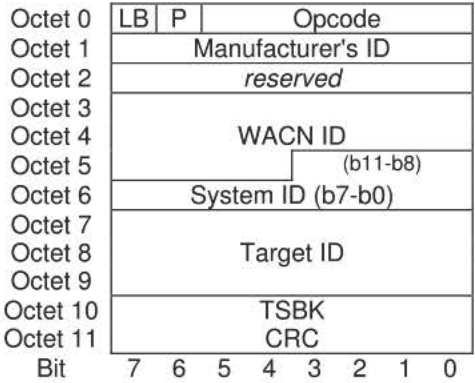


Figure 6.2.3-1 Authentication Command

The Opcode field (octet 0, bit 5-0) indicates this is the request for the target SU to perform Authentication. This is set to %101110.



6.2.4 Call Alert (CALL_ALERT)

This is the request for a target SU to call a source SU.

6.2.4.1 Abbreviated Format

This format for CALL_ALERT may be used if both the Source SU and the Target SU are members of the same HOME system, and the target SU currently resides in the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	<i>reserved</i>							
Octet 3	<i>reserved</i>							
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source ID							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0



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Figure 2.4.1 Call Alert - Abbreviated Format

147 / 182

The Opcode field (octet 0, bit 5-0) indicates the Call Alert. This is set to %011111.

6.2.4.2 Extended Format

This format may be used for CALL_ALERT. This format shall be used for CALL_ALERT if the abbreviated format is not appropriate.

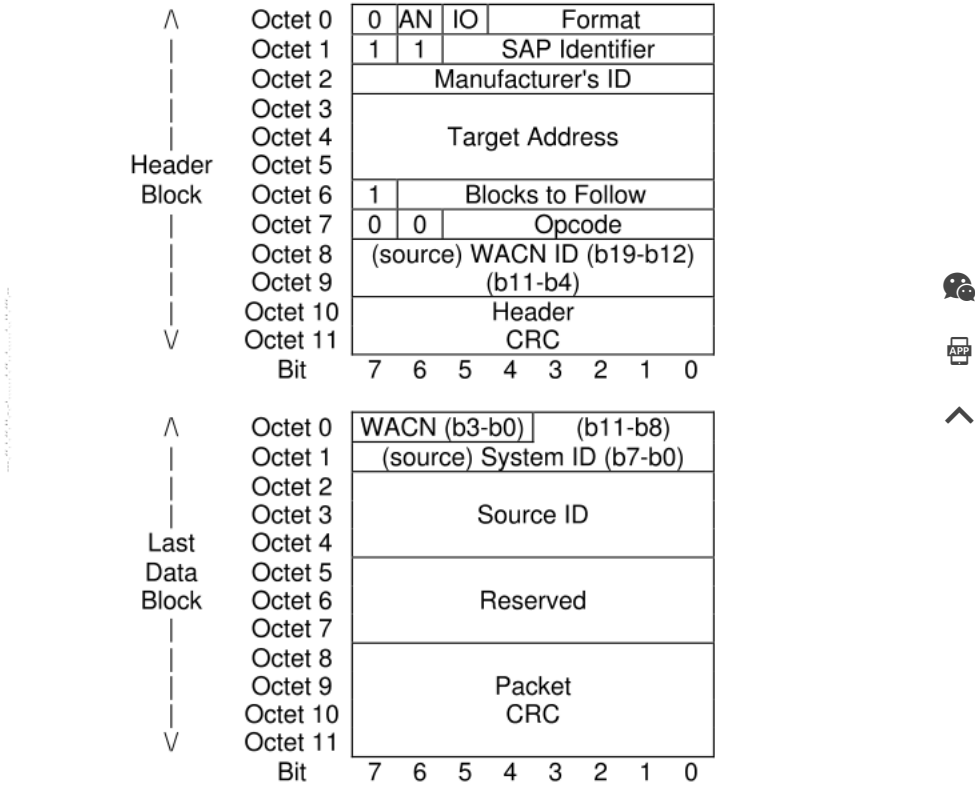


Figure 6.2.4-2 Call Alert - Extended Format

- IO = %1 (OSP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001(one data block after the Header Block)
- Opcode = %011111 (CALL_ALERT)



6.2.5 Deny Response (DENY_RSP)

This is the response to a service requesting unit to indicate a problem with the request.

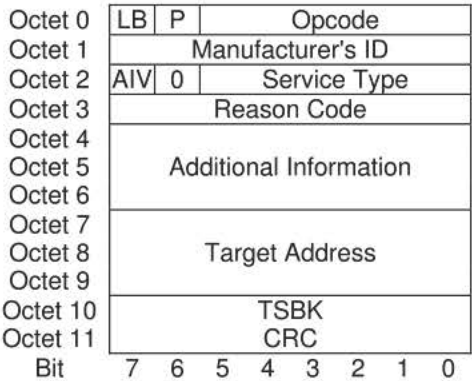


Figure 6.2.5-1 Deny Response

The OPCODE field (octet 0, bits 5-0) identify this as the DENY response, by assuming the value of %100111.

The Target Address identifies the address which sourced the identified service being denied.

Additional Information field (octets 4-6):

If the service to be denied is a Group audience service (Voice or Data), then this field will be populated as follows:

- octet 4 call options applied to this service
- octet 5,6 the 16-bit group address

If the service to be denied is an Individual audience service (Voice or Data), then this field will be populated as follows:

- octet 4-6 the 24-bit address of the target unit of the call

(Refer to normative Annex B for Deny Response Reason Code table.)



6.2.6 Extended Function Command (EXT_FNCT_CMD)

This is the transaction addressed to an SU for an extended function.

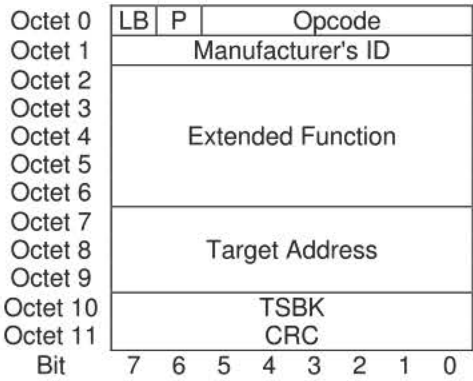


Figure 6.2.6-1 Extended Function Command

The Opcode will indicate the Extended Function command, denoted as: %100100.



6.2.7 Group Affiliation Query (GRP_AFF_Q)

This transaction is to be used to determine what a targeted subscriber unit maintains as the group affiliation data for the unit. The Query will usually originate in the system, but the standard enables other originators.

6.2.7.1 Abbreviated Format

This format may be used for a GRP_AFF_Q if both the source and target SU are members of the same HOME system, AND the target SU resides at the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	<i>reserved</i>							
Octet 3	<i>reserved</i>							
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.7-1 Group Affiliation Query - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates this is the request for the current group affiliation data from an affiliated subscriber unit. This is set to %101010.



6.2.7.2 Extended Format

This format may be used for GRP_AFF_Q. This format shall be used for GRP_AFF_Q if the abbreviated format is not appropriate.

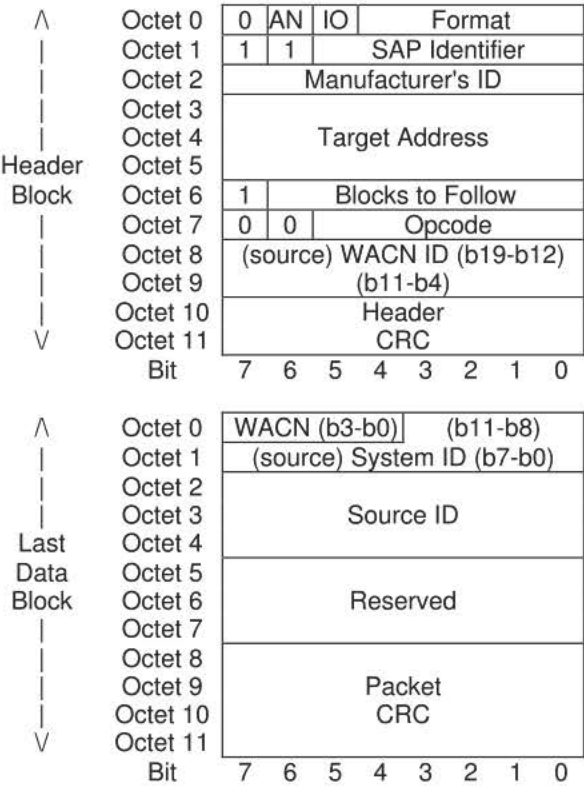


Figure 6.2.7-2 Group Affiliation Query - Extended Format

- IO = %1 (OSP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001(one data block after the Header Block)
- Opcode = %101010 (GRP_AFF_Q)



6.2.8 Group Affiliation Response (GRP_AFF_RSP)

This is the response to the request for group affiliation by a unit. This will present the necessary information to the requesting unit to allow it to perform group operations for the indicated group identity.

6.2.8.1 Abbreviated Format

This format may be used for a GRP_AFF_RSP if both the group and target SU have the same HOME system designation, AND the target unit resides in the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	LG	Reserved				GAV		
Octet 3	Announcement							
Octet 4	Group Address							
Octet 5	Group Address							
Octet 6								
Octet 7	Target Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.8-1 Group Affiliation Response - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates this is the response to associate specific group activity with this particular unit. The Opcode assumes the value %101000.

The LG bit indicates Local or Global affiliation.
LG=0 for Local and
LG=1 for Global.

The GAV argument is a Group Affiliation Value.
%00 = AFF_ACCEPT indicates affiliation acceptance
%01 = AFF_FAIL indicates affiliation failure
%10 = AFF_DENY indicates affiliation denial
%11 = AFF_REFUSED indicates that the Group Address is invalid and that the SU need not enter control channel hunt and the SU may attempt to re-affiliate after a user stimulus.



6.2.8.2 Extended Format

This format may be used for GRP_AFF_RSP. This format shall be used for GRP_AFF_RSP if the abbreviated format is not appropriate.

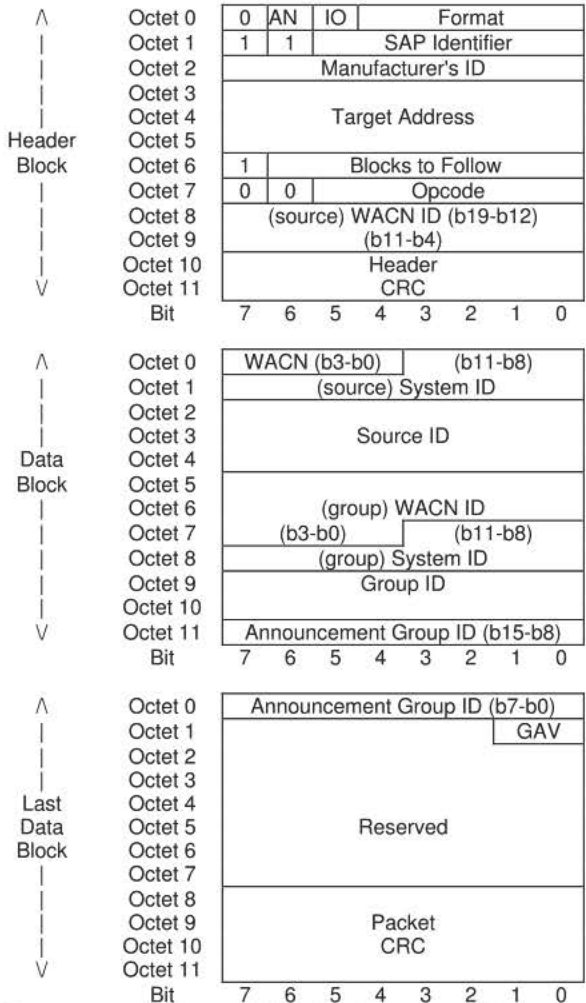


Figure 6.2.8-2 Group Affiliation Response - Extended Format

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000010 (two data blocks after the Header Block)
Opcode = %101000 (GRP_AFF_RSP)



6.2.9 Identifier Update (IDEN_UP)

The following message format will be used to inform the subscriber units of the channel parameters to associate with a specific channel identifier. The following message applies for Base Frequencies outside of the VHF and UHF bands, 136 MHz to 172 MHz and 380 MHz to 512 MHz. The format given in figure 6.2.9-2 applies for Base Frequencies in the VHF and UHF bands.

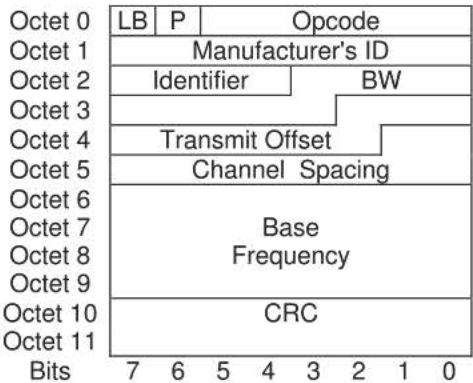


Figure 6.2.9-1 Identifier Update

The Opcode field (octet 0, bit 5-0) indicates this is a channel Identifier Update. This is set to %111101.

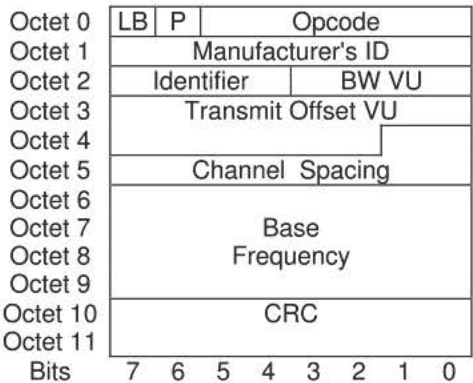


Figure 6.2.9-2 Identifier Update Message for the VHF and UHF Bands



SP-3-4661-RV2 TIA-102.AABC-B

The Opcode field (octet 0, bit 5-0) is set to %111101 as in the Identifier Update for the VHF and UHF bands (no change to the opcode). The Identifier Update for the VHF and UHF band is determined by the Base Frequency.

The BW VU field (octet 2, bits 3-0) takes on the following values for receiver bandwidth.

%0000 - %0011	reserved
%0100	6.25 kHz receiver bandwidth
%0101	12.5 kHz receiver bandwidth
%0111 - %1111	reserved

The Transmit Offset VU field (octet 3 and octet 4, bits 7-2) represents the separation from the subscriber receive frequency to the subscriber transmit frequency. The most significant bit (octet 3, bit 7) takes the following values.

- %0 = SU transmit < SU receive frequency, Sign = -1
- %1 = SU transmit > SU receive frequency, Sign = +1

The first SU transmit frequency is designated as the SU transmit base frequency. Additional SU transmit frequencies are computed according to the usual rule for channel addressing. The SU transmit base frequency is computed as follows.

$$\text{SU TX base frequency (MHz)} = \text{Base Frequency} \times 0.000005 \text{ MHz} + \text{Sign (Transmit Offset VU} \times \text{Channel Spacing} \times 0.125 \text{ kHz)}$$

Channel Spacing is defined in section 2.3.10.

The Base Frequency is defined in section 2.3.5. Valid Base Frequencies have to fall into the VHF band in the range of 136.000 – 172.000 MHz (hexadecimal values for the field are in the range \$019F0A00 – \$020CE700) or fall into the UHF band in the range of 380.000 – 512 MHz (hexadecimal values for the field are in the range \$0487AB00 – \$061A8000). Base Frequencies outside of this range shall not use the format given in figure 6.2.9-2.

6.2.10 Message Update (MSG_UPDT)

This is the echo of the short data message from a subscriber unit when the destination of the message is another subscriber unit via control channel signaling.

6.2.10.1 Abbreviated Format

This format may be used for a MSG_UPDT if both the source and target are members of the same HOME system, and at least one unit resides in the HOME system.

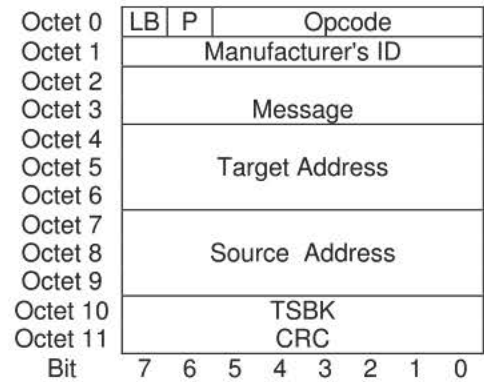


Figure 6.2.10-1 Message Update - Abbreviated Format

The Opcode field (octet 0, bit 5-0) indicates this is short data message to the target SU. This is set to %011100.



6.2.10.2 Extended Format

This format may be used for any MSG_UPDT. This format shall be used for a MSG_UPDT if the abbreviated format is not appropriate.

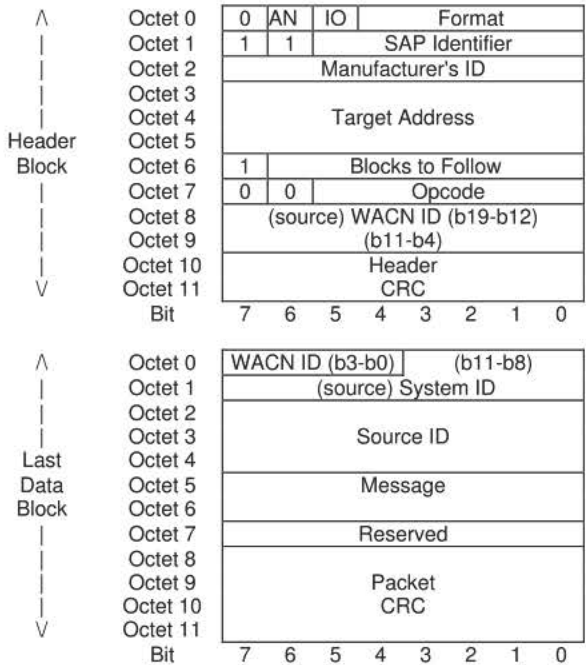


Figure 6.2.10-2 Message Update - Extended Format

- IO = %1 (OSP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001 (one data blocks after the Header Block)
- Opcode = %011100 (MSG_UPDT)

6.2.11 Network Status Broadcast (NET_STS_BCST)

This provides the current WACN and SYSTEM identity information to the subscriber units monitoring this control channel.

6.2.11.1 Abbreviated Format

The Abbreviated Format of the Network Status Broadcast (NET_STS_BCST) is used when an explicit designation for the transmit and receive frequency values is not required for the frequency band being used (currently, non-VHF/UHF operations).

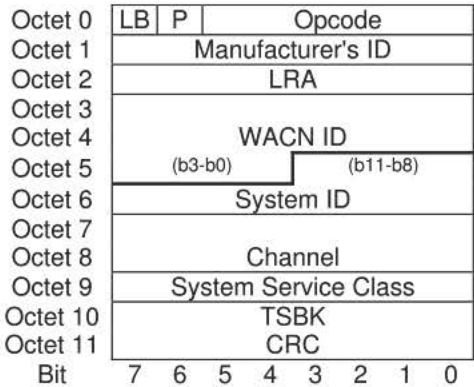


Figure 6.2.11-1 Network Status Broadcast

The OPCODE field (octet 0, bit 5-0) indicates this is a Network status broadcast. This is denoted by the value %111011.

The Channel field (octets 7-8) refers to the Primary control channel for this site.

6.2.11.2 Extended Format

The Extended Format of the Network Status Broadcast (NET_STS_BCST) is used when an explicit designation for the transmit and receive frequency values is required for the frequency band being used (currently, VHF/UHF operations). This is accommodated with explicit channel fields for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency components.

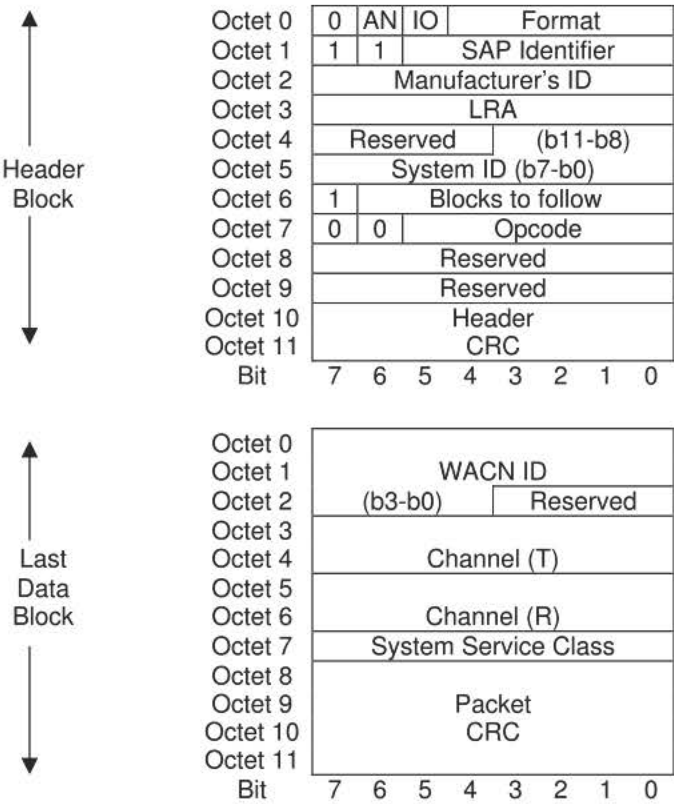


Figure 6.2.11-2: Network Status Broadcast - Extended Format

- IO = %1 (OSP)
- Format = %10111 (alternate multiple block trunking control)
- Blocks to Follow = %0000001 (one data block after the Header Block)
- Opcode = %111011 (NET_STS_BCST)
- Channel (T) = FNE transmit channel value
- Channel (R) = FNE receive channel value

6.2.12 Protection Parameter Broadcast (P_PARM_BCST)

This will inform the protected subscriber units on this control channel of the current protection parameter set in effect for this channel. This will allow the subscriber units to make adjustments in their internal control programs to maintain proper communications with the control channel.

Figure 6.2.12-1 depicts the Protection parameter broadcast. The following fields are of special note:

IO	= %1 (OSP)
Format	= %10111 (alternate multiblock trunking control)
Blocks to Follow	= %0000010 (2 data blocks after the Header Block)

The Target Address field (octets 3-5 of the Header Block) is set to the ALL unit identity, \$FF FFFF.

The Opcode field (octet 7, bit 5-0) indicates this is a Protection parameter broadcast. This assumes the value of %111110.

The Type field (octet 8) indicates the value of the Protection Parameter 3 update, %83.

Algorithm ID field (octet 9) identifies the encryption algorithm in systems with multiple algorithms.

Key ID field (first data block, octets 0-1) identifies the encryption key for systems with multiple encryption keys.

The Inbound MESSAGE INDICATOR field (first data block, octet 2-10) indicates the current initialization vector for use upon this inbound control channel for the protection process.

The OUTBOUND MESSAGE INDICATOR field (first data block, octet 11, last data block, octets 0-7) indicates the current initialization vector for use upon this outbound control channel for the protection process.



SP-3-4661-RV2 TIA-102.AABC-B

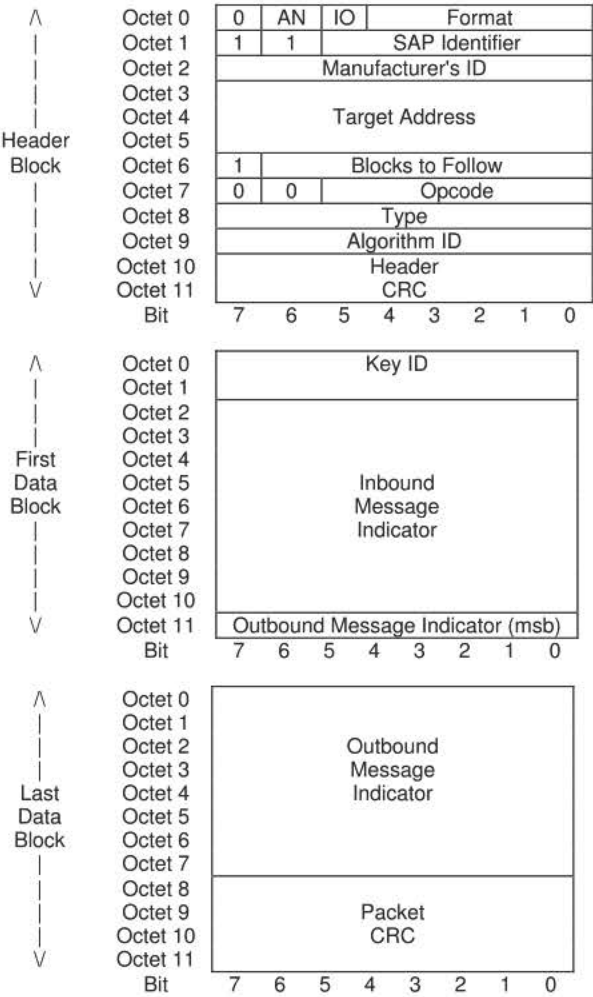


Figure 6.2.12-1 Protection Parameter Broadcast

6.2.13 Protection Parameter Update (P_PARM_UPDT)

This is the transaction to deliver protection parameters for the control channel to the SU.

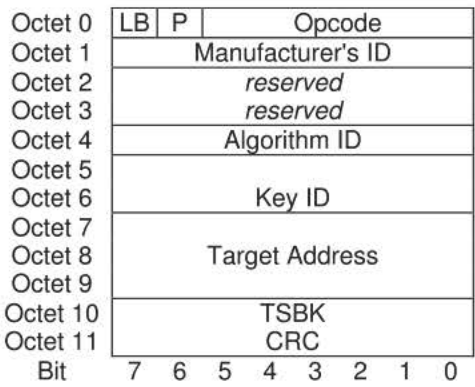


Figure 6.2.13-1 Protection Parameter Update

The opcode is set to the Protection parameter update value of %111111.

Algorithm ID field (octet 4) identifies the encryption algorithm in systems with multiple algorithms.

Key ID field (octets 5-6) identifies the encryption key for systems with multiple encryption keys.

SP-3-4661-RV2 TIA-102.AABC-B

6.2.14 Queued Response (QUE_RSP)

This is the response to indicate a requested service can not be granted at this time.

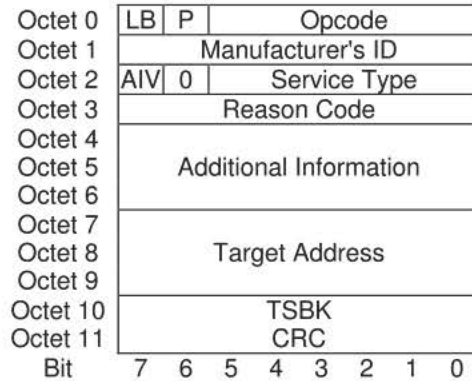


Figure 6.2.14-1 Queued Response

The Opcode field (octet 0, bits 5-0) identifies this as the Queued response, with value of %100001.

The Target Address identifies the address which sourced the identified service being queued.

Additional Information field (octets 4-6):

If the service to be queued is a Group audience service (Voice or Data), then this field will be populated as follows:

octet 4 Call Options applied to this service
octet 5,6 the 16-bit Group Address

If the service to be queued is an Individual audience service (Voice or Data), then this field will be populated as follows:

octet 4-6 the 24-bit address of the Target Unit of the call

If the service to be queued is an Individual audience service (Voice or Data) involving telephone interconnect, then this field will be populated as follows:

octet 4-6 The EXPECTED QUEUE TIME PERIOD is presented in this field.
This will indicate the expected time in queue as multiples of 5 seconds.

(Refer to normative Annex C for Queued Response Reason Code table.)

6.2.15 RFSS Status Broadcast (RFSS_STS_BCST)

This provides the current RF Sub-system and Site identity to the subscriber units monitoring this control channel.

6.2.15.1 Abbreviated Format

The Abbreviated Format of the RFSS Status Broadcast (RFSS_STS_BCST) is used when an explicit designation for the transmit and receive frequency values is not required for the frequency band being used (currently, non-VHF/UHF operations).

Octet 0	LB	P	Opcode				
Octet 1	Manufacturer's ID						
Octet 2	LRA						
Octet 3	reserved		A	(b11-b8)			
Octet 4	System ID						
Octet 5	RF Sub-system ID						
Octet 6	Site ID						
Octet 7	Channel						
Octet 8							
Octet 9	System Service Class						
Octet 10	TSBK						
Octet 11	CRC						
Bit	7	6	5	4	3	2	1 0

Figure 6.2.15-1 RFSS Status Broadcast

The OPCODE field (octet 0, bit 5-0) indicates this is a RFSS status broadcast. This is denoted by the value %111010.

The signalling bit in octet 3 has the following meaning.
A (octet 3, bit 4) - This field will specify if the site has an active network connection with the RFSS controller, i.e., communication with other sites is possible. A value of 1 will indicate a valid RFSS network connection is active.

The Channel field (octets 7-8) addresses the Primary control channel of this site.



6.2.15.2 Extended Format

The Extended Format of the RFSS Status Broadcast (RFSS_STS_BCST) is used when an explicit designation for the transmit and receive frequency values is required for the frequency band being used (currently, VHF/UHF operations). This is accommodated with explicit channel fields for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency components.

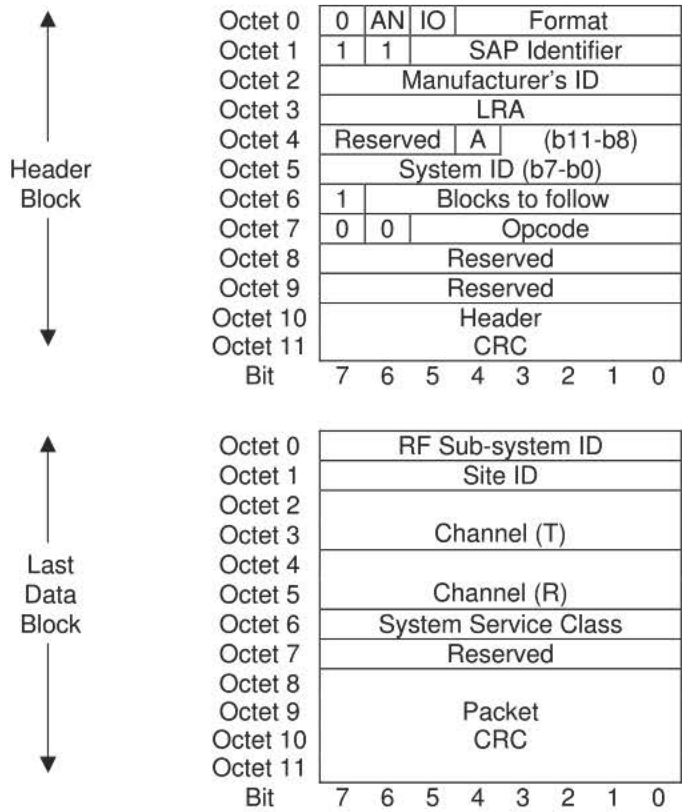


Figure 6.2.15-2: RFSS Status Broadcast (RFSS_STS_BCST) - Extended Format

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001(one data block after the Header Block)
Opcode = %111010 (RFSS_STS_BCST)
Channel (T) = FNE transmit channel value
Channel (R) = FNE receive channel value



6.2.16 Secondary Control Channel Broadcast (SCCB)

This addresses the current secondary control channel assignments for this SITE. This will identify the designated secondary control channels along with what they have been designated to support for service offering.

This supports two(2) secondary control channel updates per packet. If there is an odd number of secondary control channels on the site, then either one of the channels may be repeated to fill the space, or the System Service Class field may be set to \$00 to indicate this set of channel parameters are not to be considered a valid secondary control channel.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	RF Sub-System ID							
Octet 3	Site ID							
Octet 4	Channel							
Octet 5								
Octet 6	System Service Class							
Octet 7	Channel							
Octet 8								
Octet 9	System Service Class							
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.16-1 Secondary Control Channel Broadcast

The Opcode field (octet 0, bit 5-0) indicates this is a Secondary Control channel status broadcast. This is denoted by the value %111001.

SP-3-4661-RV2 TIA-102.AABC-B

6.2.17 Status Query (STS_Q)

An appropriate SU may request the current status condition for another SU.

6.2.17.1 Abbreviated Format

This format may be used for a STS_Q if the source and target share a common HOME system designation, AND the target unit resides in the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	<i>reserved</i>							
Octet 3	<i>reserved</i>							
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.17-1 Status Query - Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this is the request for Status update from an identified SU. This is set to the value of %011010

6.2.17.2 Extended Format

This format may be used for STS_Q. This format shall be used for STS_Q if the abbreviated format is not appropriate.

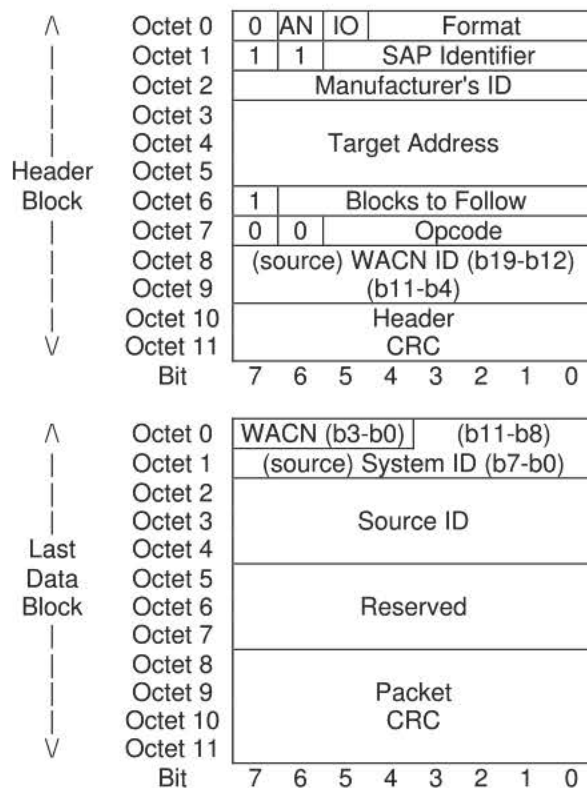


Figure 6.2.17-2 Status Query - Extended Format

IO	= %1 (OSP)
Format	= %10111 (alternate multiblock trunking control)
Blocks to Follow	= %0000001 (one data block after the Header Block)
Opcode	= %011010 (STS_Q)



SP-3-4661-RV2 TIA-102.AABC-B

6.2.18 Status Update (STS_UPDT)

This is the echo of the status update from a subscriber unit when the destination of the update is another subscriber unit via control channel signaling.

6.2.18.1 Abbreviated Format

This format may be used for a STS_UPDT if both the source and target have the same HOME system designation, AND the target unit resides in the HOME system.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Status							
Octet 3								
Octet 4	Target Address							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.18-1 Status Update - Abbreviated Format

The Opcode field (octet 0, bits 5-0) indicates this is the Status update from an identified subscriber unit. This is set to the value of %011000.



6.2.18.2 Extended Format

This format may be used for STS_UPDT. This format shall be used for a STS_UPDT when the abbreviated format is not appropriate.

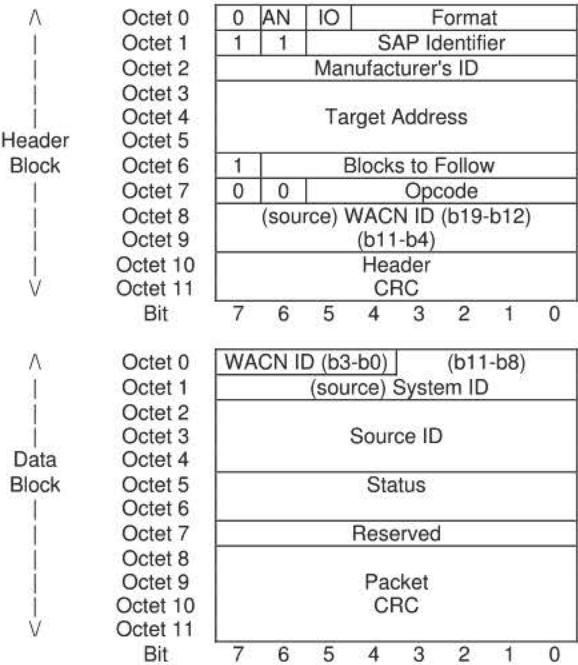


Figure 6.2.18-2 Status Update - Extended Format

- IO = %1 (OSP)
- Format = %10111 (alternate multiblock trunking control)
- Blocks to Follow = %0000001 (one data blocks after the Header Block)
- Opcode = %011000 (STS_UPDT)

SP-3-4661-RV2 TIA-102.AABC-B

6.2.19 System Service Broadcast (SYS_SRV_BCST)

This broadcast will inform the subscriber units of the current system services supported and currently offered on the Primary control channel of this site. It will also indicate the current priority level threshold for service request activity on the Primary control channel.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	<i>reserved</i>							
Octet 3	System Services Available							
Octet 4								
Octet 5								
Octet 6	System Services Supported							
Octet 7								
Octet 8								
Octet 9	Request Priority Level							
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.19-1 System Service Broadcast

The OPCODE field (octet 0, bit 5-0) indicates this is a Service Class broadcast. This assumes the value of %111000.

The SYSTEM SERVICES AVAILABLE field (Octets 3-5) indicates the system level services which may be currently requested at this site. A "1" in the service position indicates the service is available. (The SYSTEM SERVICES are defined in Tables 6.2.19-1 and 6.2.19-2 found below.)

The SYSTEM SERVICES SUPPORTED field (Octets 6-8) indicates the system level services which this site is equipped to handle, though some or all of these may not be currently available. A "1" in the service position indicates the service is supported. (The SYSTEM SERVICES are defined in Tables 6.2.19-1 and 6.2.19-2 found below.)

The Request Priority Level field (octet 9) indicates the lowest service request priority which will be processed by this site at this time. The values shall be those of the Priority Level section (bits 2 – 0) of the Service Options field as denoted in Section 2.3.24. It should be noted that the intentions of bits 7 – 3, as described under Service Options in section 2.3.24 do not align with the intentions of the Request Priority Level field and are therefore not relevant for use in Octet 9 of the System Service Broadcast Message.



SP-3-4661-RV2 TIA-102.AABC-B

(MSB) b1	- TYPE FLAG=0	b13	- unit registration
b2	- EXTENSION FLAG	b14	- group affiliation
b3	- network active	b15	- group affiliation query
b4	- <i>reserved</i>	b16	- authentication
b5	- group voice	b17	- protection parameters
b6	- individual voice	b18	- user status
b7	- PSTN to unit voice	b19	- user message
b8	- unit to PSTN voice	b20	- unit status
b9	- <i>reserved</i>	b21	- user status query
b10	- group data	b22	- unit status query
b11	- individual data	b23	- unit page
b12	- <i>reserved</i>	(LSB) b24	- emergency alarm

Table 6.2.19-1 Normal System Services

(MSB) b1	- TYPE FLAG=1	b13	- <i>reserved</i>
b2	- EXTENSION FLAG	b14	- <i>reserved</i>
b3	- network active	b15	- <i>reserved</i>
b4	- <i>reserved</i>	b16	- <i>reserved</i>
b5	- <i>reserved</i>	b17	- <i>reserved</i>
b6	- <i>reserved</i>	b18	- <i>reserved</i>
b7	- <i>reserved</i>	b19	- <i>reserved</i>
b8	- <i>reserved</i>	b20	- <i>reserved</i>
b9	- <i>reserved</i>	b21	- <i>reserved</i>
b10	- <i>reserved</i>	b22	- <i>reserved</i>
b11	- <i>reserved</i>	b23	- <i>reserved</i>
b12	- <i>reserved</i>	(LSB) b24	- <i>reserved</i>

Table 6.2.19-2 Extended System Services

There is currently the potential to support all the defined services as well as potential to identify 24 additional services. This is accomplished by supplying an extension service update category. There is the potential for three(3) additional services supported in the Normal SYSTEM SERVICE category.

b1 - TYPE FLAG - this will denote whether this is the "normal" set of system services or an "extended" set. Normal set =0; Extended set =1

b2 - Extension flag - this will indicate whether there are more system services to be indicated. No extension=0; extension=1

If there are no extension services beyond the capacity of the Normal SYSTEM SERVICE set, then there is no Extended SYSTEM SERVICE update necessary.



SP-3-4661-RV2 TIA-102.AABC-B

b3 - Network active - this will indicate whether this segment of the communication fixed end is connected to other segments, or is this an isolated segment. Isolated = 0;

6.2.20 Unit Registration Command (U_REG_CMD)

This transaction is to be used to force an SU to initiate Unit Registration.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	<i>reserved</i>							
Octet 3	<i>reserved</i>							
Octet 4	Target ID							
Octet 5								
Octet 6								
Octet 7	Source Address							
Octet 8								
Octet 9								
Octet 10	TSBK CRC							
Octet 11								
Bit	7	6	5	4	3	2	1	0

Figure 6.2.20-1 Unit Registration Command

The Opcode field (octet 0, bit 5-0) indicates this is the request for the target SU to perform unit registration. This is set to %101101.



6.2.21 Unit Registration Response (U_REG_RSP)

6.2.21.1 Abbreviated Form

This is the form for the Unit Registration response when the WACN ID of the source unit matches the WACN ID for this current Site.

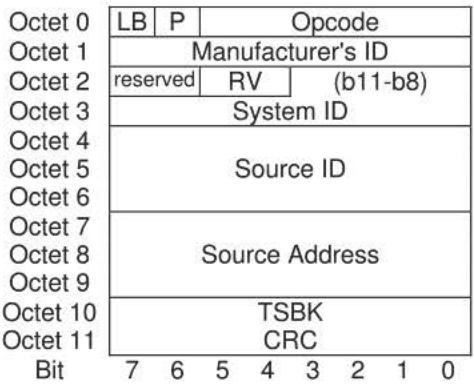


Figure 6.2.21-1 Unit Registration Response - Abbreviated Format

The OPCODE field (octet 0, bit 5-0) indicates this is a Unit Registration transaction. This is denoted by the value %101100.

RV (octet 2 bits 4 and 5) is the Registration Value. The following values are defined.

- %00 = REG_ACCEPT indicates that registration is accepted.
- %01 = REG_FAIL indicates that the RFSS was unable to verify registration.
- %10 = REG_DENY indicates that registration is not allowed at the location.
- %11 = REG_REFUSED indicates that the WUID is invalid but the SU need not enter control channel hunt and the SU may attempt to re-register after a user stimulus.



6.2.21.2 Extended Form

This is the form for the Unit Registration response when the WACN ID of the source unit does not match the WACN ID for this current Site. This is depicted in Figure 6.2.21-2 with the following special field values:

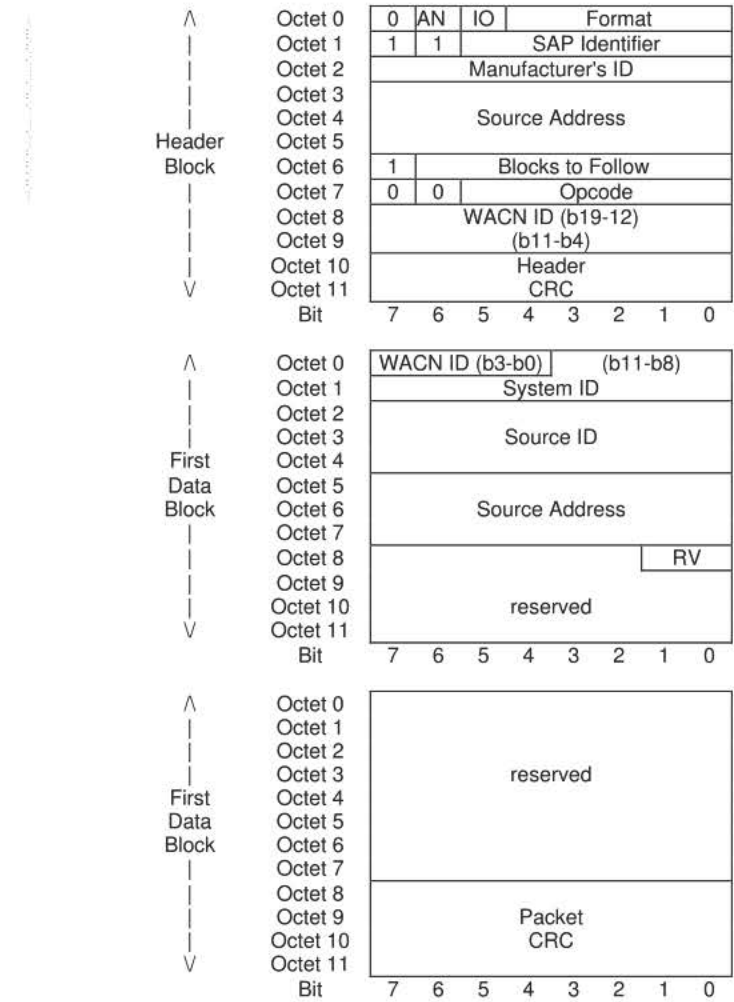


Figure 6.2.21-2 Unit Registration Response - Extended Format

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Source Address
 octets 3-5 = Registration Default (\$FF FFFE)
 octets 5-7 = assigned address according to section 2.3.27.
Blocks to Follow = %0000010 (two data blocks after the Header Block)
Opcode = %101100 (U_REG_RSP)

6.2.22 De-Registration Acknowledge (U_DE_REG_ACK)

This transaction is to be used to acknowledge that a de-registration request has been accomplished by the FNE, for the indicated SU identity.

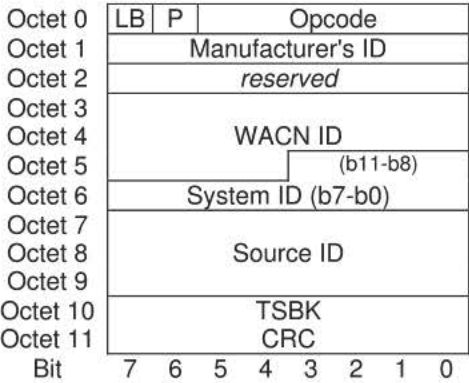


Figure 6.2.22-1 De-Registration Acknowledge

The Opcode field (octet 0, bit 5-0) indicates this is the de-registration acknowledgment. This is set to %101111.



6.2.23 Location Registration Response (LOC_REG_RSP)

This transaction is to be used to respond to a Location Registration Request. The response indicates that the subscriber is registered in the new location area.

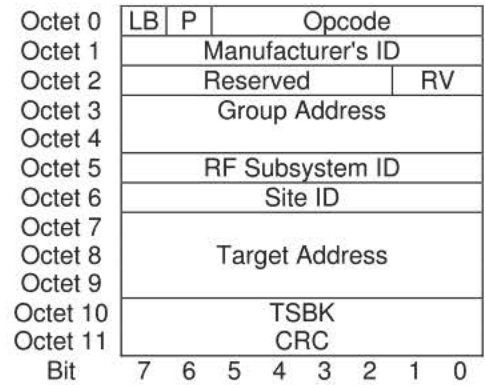


Figure 6.2.23-1 Location Registration Response

The Opcode field (octet 0, bit 5-0) indicates this is the location registration response. This is set to %101011.

RV (octet 2 bits 0 and 1) is the Registration Value. The following values are defined.

- %00 = REG_ACCEPT indicates that registration is accepted.
- %01 = REG_FAIL indicates that the RFSS was unable to verify registration.
- %10 = REG_DENY indicates that registration is not allowed at the location.
- %11 = REG_REFUSED indicates that the WUID is invalid but the SU need not enter control channel hunt and the SU may attempt to re-register after a user stimulus.

The Group Address and Target Address indicate the current addresses for the target subscriber.

The RF Subsystem ID and Site ID identify the location down to the site level within the Location Registration Area (LRA).



6.2.24 Radio Unit Monitor Command (RAD_MON_CMD)

This transaction is used to command a radio to execute a Radio Unit Monitor operation.

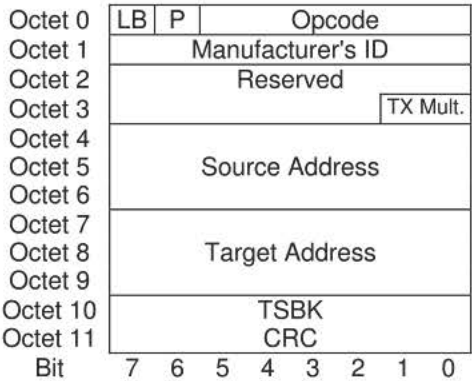


Figure 6.2.24-1 Radio Unit Monitor Command

The TX Multiplier (octet 3, bits 1,0) is a 2-bit value ranging from 0 to 3. It multiplies a stored value programmed in the target radio to represent the requested time to key the transmitter during the monitor function. The zero value does not cause the radio to key.

The Source Address (octets 4-6) is the address of the unit that wishes to monitor the target. The Target Address (octets 7-9) is the address of the radio to be monitored.

The Opcode field (octet 0, bit 5-0) indicates this is the radio unit monitor command. This is set to %011101.

6.2.25 Roaming Address Command (ROAM_ADDR_CMD)

This message is sent from the RFSS to the SU to manipulate the Roaming Address Stack. This command can write a new WACN + System ID, it can selectively delete an existing WACN + System ID, it can read the roaming address stack contents, and it can clear all of the erasable WACN + System IDs in the SU. When the Stack Operation is a Clear operation or a Read operation, the WACN + System ID may be null values. The receiver does not process the WACN + System ID values for the Clear or Read operations. The Read operation is used to request the target SU to send the stack contents to the RFSS.

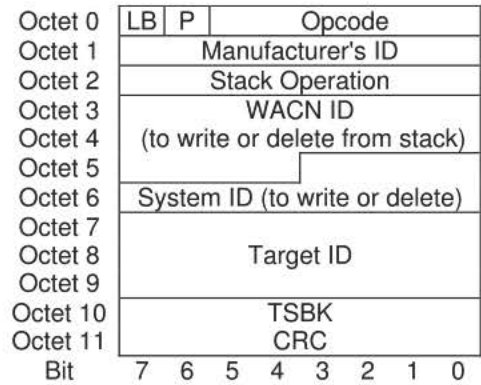


Figure 6.2.25-1 Roaming Address Command

The Opcode field (octet 0, bit 5-0) indicates this is the roaming address command. This is set to %110110.

The Stack Operation value in octet 2 takes on values given in Table 6.2.25-1.

Table 6.2.25-1 Stack Operations	
Stack Operation	Meaning
\$00	Clear the stack
\$01	Write the WACN + System ID to the stack
\$02	Delete the WACN + System ID from stack
\$03	Read the stack contents to the RFSS
other values	reserved operations



6.2.26 Roaming Address Update (ROAM_ADDR_UPDT)

This message responds to the ROAM_ADDR_REQ to list the contents of a Roaming Address Stack for the source SU, to the target SU. Three versions of this update are provided to convey up to 7 records of the stack. Any number of these messages may be sent consecutively to convey the contents of the stack.

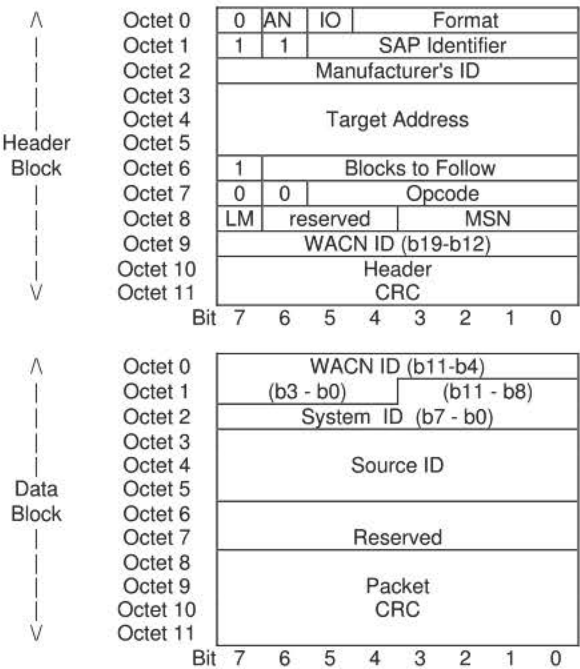


Figure 6.2.26-1 Roaming Address Update - Extended Format 1

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000001 (one data block after the Header Block)
Opcode = %110111
LM = Last Message. This is set to 1 to indicate last ROAM_ADDR_UPDT message in a sequence. If there is only one ROAM_ADDR_UPDT message, then LM is also set to 1. LM is cleared to 0 on any ROAM_ADDR_UPDT message other than the last or only message.
MSN = Message Sequence Number. This field is set to 0 for the first ROAM_ADDR_UPDT message in a sequence, and is incremented for each subsequent message. If more than 16 messages are sent, the MSN is reset to 0 on the 17-th message, and then incremented for the 18-th and subsequent messages.



SP-3-4661-RV2 TIA-102.AABC-B

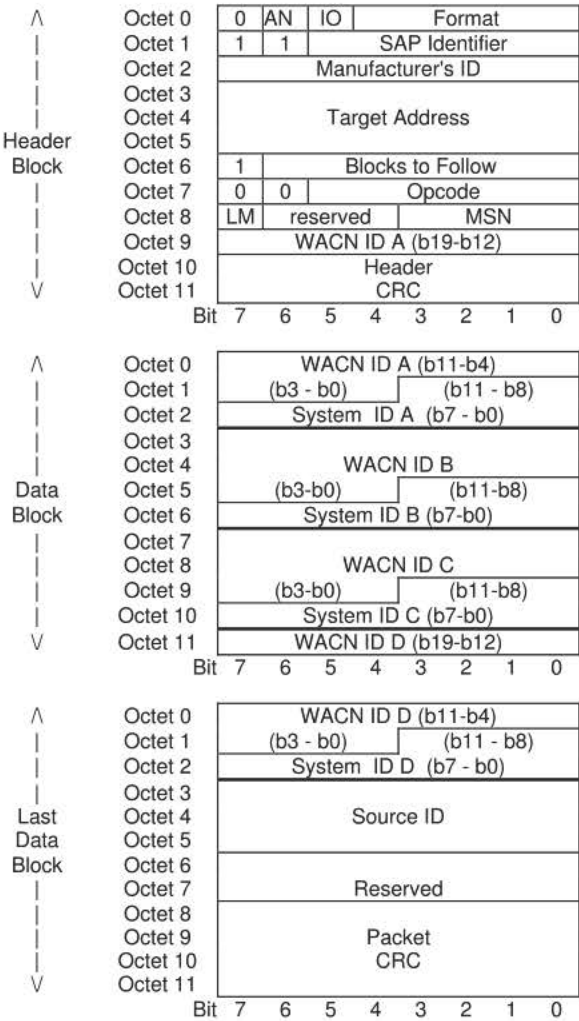


Figure 6.2.26-2 Roaming Address Update - Extended Format 2

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000010 (two data blocks after the Header Block)
Opcode = %110111

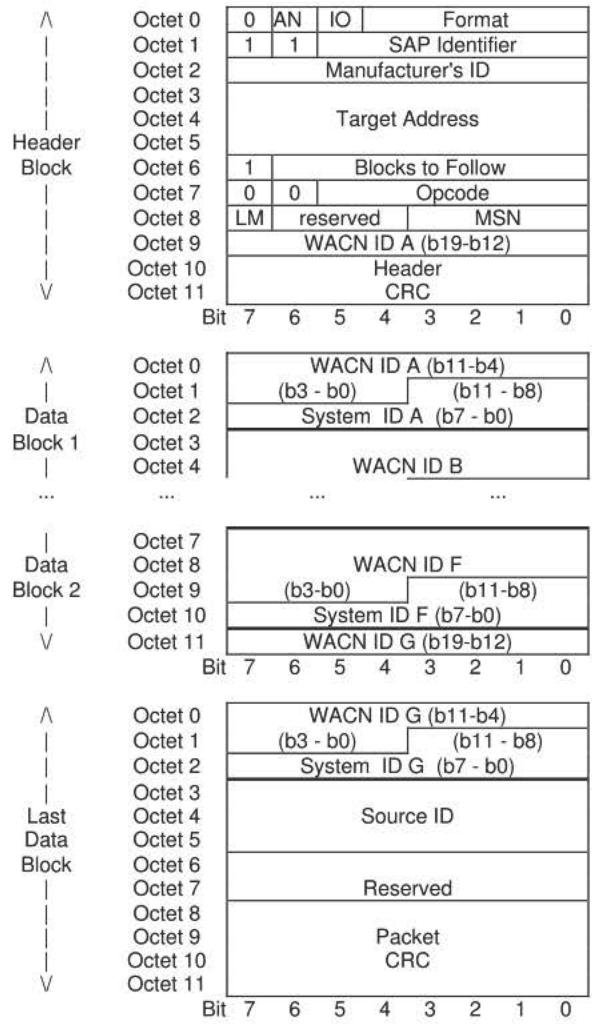


Figure 6.2.26-3 Roaming Address Update - Extended Format 3

IO = %1 (OSP)
Format = %10111 (alternate multiblock trunking control)
Blocks to Follow = %0000011 (three data blocks after the Header Block)
Opcode = %110111

SP-3-4661-RV2 TIA-102.AABC-B

6.2.27 Time and Date Announcement (TIME_DATE_ANN)

Octet 0	LB	P	Opcode				
Octet 1	MFID						
Octet 2	VD	VT	VL	res	Local Time Offset		
Octet 3	Local Time Offset						
Octet 4	Date						
Octet 5							
Octet 6							
Octet 7	Time						
Octet 8							
Octet 9							
Octet 10	TSBK						
Octet 11	CRC						
Bit	7	6	5	4	3	2 1 0	

Figure 6.2.27-1 Time and Date Announcement

The Opcode field (octet 0, bits 5-0) specifies this is the time and date broadcast, %110101.

VD - %1 indicates that the Date field contains valid information. %0 indicates that the Date field should be ignored.

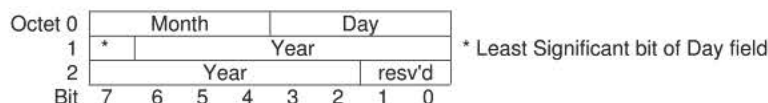
VT - %1 indicates that the Time field contains valid information. %0 indicates that the Time field should be ignored.

VL - %1 indicates that the Local Time Offset field contains valid information. %0 indicates that the Local Time Offset field should be ignored.

Local Time Offset - The local time offset is a 12 bit field that indicates the numbers of minutes difference between UTC and local time of the transmitter. The most significant bit indicates whether local time is calculated by adding to or subtracting from UTC the number of minutes indicated the message. %1 indicates the number of minutes should be subtracted from UTC while %0 indicates that the number of minutes should be added to UTC.

Octet 0	*	Number of minutes							* Indicates before or after UTC
1	Number of Mins								
Bit	7	6	5	4	3	2	1	0	

Date - The date field indicates the current date and is sub-divided into Month, Day, and Year.

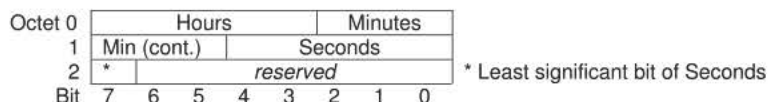


Month - This field represents the month of the year in the date field. Octet 0 bit 7 (b7) is the most significant (MS) bit of the month and Octet 0 bit 4 (b4) is the least significant (LS) bit of the month field. Valid values are 1 (0001 in binary) to 12 (1100 in binary). January is binary 0001, February is binary 0010, ..., December is binary 1100.

Day - This field represents the day of the month in the date field. This field is the 4 LS bits (b3 - 0) of octet 0 and the MS bit (b7) of octet 1. The MS bit of the day field is Octet 0 bit 3 and the LS bit is Octet 1 bit 7. Valid values are 1 (00001 in binary) to 31 (11111 in binary).

Year - This field represents the number of years past year 2000. Octet 1 bit 6 (b6) is the most significant (MS) bit of the year and Octet 2 bit 2 (b2) is the least significant (LS) bit of the year field. Valid values are 0 (0 0000 0000 0000 in binary) to 8191 (1 1111 1111 1111 in binary).

Time - The Time field indicates the current time and is sub-divided into *Hours*, *Minutes*, and *Seconds*



Hours - This field specifies the hour of the time. Octet 0 bit 7 (b7) is the most significant (MS) bit of the hour and Octet 0 bit 3 (b3) is the least significant (LS) bit of the hour field. Valid values are 0 (00000 in binary) to 23 (10111 in binary).

Minutes - This field specifies the minutes of the time. This field is the 3 LS bits (b2 - b0) of octet 0 and the 3 MS bits (b7 - b5) of octet 1. The MS bit of the Minutes field is Octet 0 bit 2 and the LS bit is Octet 1 bit 5. Valid values are 0 (000000 in binary) to 59 (111011 in binary).

Seconds - This field specifies the seconds of the time. This field is the 5 LS bits (b4 - b0) of octet 1 and the MS bit (b7) of octet 2. The MS bit of the Seconds field is Octet 1 bit 4 and the LS bit is Octet 2 bit 7. Valid values are 0 (000000 in binary) to 59 (111011 in binary).



6.2.28 Secondary Control Channel Broadcast - Explicit (SCCB_EXP)

The Secondary Control Channel Broadcast - Explicit (SCCB_EXP) addresses the current secondary control channel assignments for this SITE. The Secondary Control Channel Broadcast - Explicit (SCCB_EXP) will identify the designated secondary control channels along with what they have been designated to support for service offering.

The Secondary Control Channel Broadcast - Explicit (SCCB_EXP) supports one (1) secondary control channel update per packet.

The Secondary Control Channel Broadcast - Explicit (SCCB_EXP) is used when an explicit designation for transmit and receive frequency values is required for the frequency band being used (currently, VHF/UHF operations). This is accommodated with explicit channel fields for the FNE transmit [Channel (T)] and the FNE receive [Channel (R)] frequency components.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	RF Sub-system ID							
Octet 3	Site ID							
Octet 4	Channel (T)							
Octet 5								
Octet 6	Reserved							
Octet 7	Channel (R)							
Octet 8								
Octet 9	System Service Class							
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.28-1: Secondary Control Channel Broadcast - Explicit (SCCB_EXP)

The Opcode field (octet 0, bit 5-0) indicates this is a secondary control channel status broadcast. This is denoted by the value %101001.

6.2.29 Identifier Update (IDEN_UP_VU) for VHF/UHF Bands

The following message format will be used to inform the subscriber units of the channel parameters to associate with a specific channel identifier.

The format given in figure 6.2.9-2 applies for Base Frequencies in the VHF and UHF bands.

Octet 0	LB	P	Opcode					
Octet 1	Manufacturer's ID							
Octet 2	Identifier			BW VU				
Octet 3								
Octet 4	Transmit Offset VU							
Octet 5	Channel Spacing							
Octet 6	Base Frequency							
Octet 7								
Octet 8								
Octet 9								
Octet 10	TSBK							
Octet 11	CRC							
Bit	7	6	5	4	3	2	1	0

Figure 6.2.29-1: Identifier Update Message for VHF/UHF Bands

The Opcode field (octet 0, bit 5-0) indicates this is a channel Identifier Update for VHF/UHF bands. This is set to %110100.

The Identifier Update for VHF/UHF Bands contains the Base Frequency.

The BW VU field (octet 2, bits 3-0) takes on the following values for receiver bandwidth.

%0000 - %0011	reserved
%0100	6.25 kHz receiver bandwidth
%0101	12.5 kHz receiver bandwidth
%0111 - %1111	reserved

The Transmit Offset VU field (octet 3 and octet 4, bits 7-2) represents the separation from the subscriber receive frequency to the subscriber transmit frequency. The most significant bit (octet 3, bit 7) takes the following values.

%0	= SU transmit < SU receive frequency, Sign = -1
%1	= SU transmit > SU receive frequency, Sign = +1

The first SU transmit frequency is designated as the SU transmit base frequency. Additional SU transmit frequencies are computed according to the usual rule for channel addressing. The SU transmit base frequency is computed as follows.

$$\text{SU TX base frequency (MHz)} = \text{Base Frequency} \times 0.000005 \text{ MHz} + \text{Sign (Transmit Offset VU} \times \text{Channel Spacing} \times 0.125 \text{ kHz)}$$



SP-3-4661-RV2 TIA-102.AABC-B

Channel Spacing is defined in section 2.3.10.

The Base Frequency is defined in section 2.3.5. Valid Base Frequencies have to fall into the VHF band in the range of 136.000 – 172.000 MHz (hexadecimal values for the field are in the range \$019F0A00 – \$020CE700) or fall into the UHF band in the range of 380.000 – 512 MHz (hexadecimal values for the field are in the range \$0487AB00 – \$061A8000). Base Frequencies outside of this range shall not use the format given in figure 6.2.9-2.

SP-3-4661-RV2 TIA-102.AABC-B

Annex A. Cancel Reason Codes (Normative)

Reason code value	Explanation
\$00	no reason code
\$01-0F	<i>reserved</i>
\$10	terminate queued condition
\$11-1F	<i>reserved</i>
\$20	terminate resource assignment
\$21-7F	<i>reserved</i>
\$80-FF	user or system definable



SP-3-4661-RV2 TIA-102.AABC-B

Annex B. Deny Response Reason Codes (Normative)

Reason code value	Explanation
<i>\$00-0F reserved</i>	
\$10	the requesting unit is not valid
\$11	the requesting unit is not authorized for this service
<i>\$12-1F reserved</i>	
\$20	the target unit is not valid
\$21	the target unit is not authorized for this service
<i>\$22-2E reserved</i>	
\$2F	target unit has refused this call
\$30	the target group is not valid
\$31	the target group is not authorized for this service
<i>\$32-3F reserved</i>	
\$40	invalid dialing
\$41	telephone number is not authorized
\$42	PSTN address is not valid
<i>\$43-4F reserved</i>	
\$50	call time-out has occurred
\$51	landline has terminated this call
\$52	subscriber unit has terminated this call
<i>\$53-5E reserved</i>	
\$5F	call has been pre-empted
\$60	site access denial
\$61-EF	user or system definable
\$F0	the call options are not valid for this service
\$F1	protection service option is not valid
\$F2	duplex service option is not valid
\$F3	circuit or packet mode service option is not valid
\$F4-FE	user or system definable
\$FF	the system does not support this service



SP-3-4661-RV2 TIA-102.AABC-B

Annex C. Queued Response Reason Codes (Normative)

Reason code value	Explanation
\$0-F	<i>reserved</i>
\$10	the requesting unit is active in another service
\$11-1F	<i>reserved</i>
\$20	the target unit is active in another service
\$21-2E	<i>reserved</i>
\$2F	target unit has queued this call
\$30	the target group is currently active
\$31-3F	<i>reserved</i>
\$40	channel resources are not currently available
\$41	telephone resources are not currently available
\$42	data resources are not currently available
\$43-4F	<i>reserved</i>
\$50	superseding service currently active,
\$51-7F	<i>reserved</i>
\$80-FF	user or system definable



SP-3-4661-RV2 TIA-102.AABC-B

Annex D. ISP and OSP Lists (Informative)

ISP List		
Opcode	Description	Alias
%000000	Group Voice Service Request	GRP_V_REQ
%000001	Reserved	
%000010	Reserved	
%000011	Reserved	
%000100	Unit To Unit Voice Service Request	UU_V_REQ
%000101	Unit To Unit Answer Response	UU_ANS_RSP
%000110	Reserved	
%000111	Reserved	
%001000	Telephone Interconnect Explicit Dial Request	TELE_INT_DIAL_REQ
%001001	Telephone Interconnect PSTN Request	TELE_INT_PSTN_REQ
%001010	Telephone Interconnect Answer Response	TELE_INT_ANS_RSP
%001011	Reserved	
%001100	Reserved	
%001101	Reserved	
%001110	Reserved	
%001111	Reserved	
%010000	Individual Data Service Request(OBSOLETE)	IND_DATA_REQ
%010001	Group Data Service Request(OBSOLETE)	GRP_DATA_REQ
%010010	Reserved	
%010011	Reserved	
%010100	Reserved	
%010101	Reserved	
%010110	Reserved	
%010111	Reserved	
%011000	Status Update Request	STS_UPDT_REQ
%011001	Status Query Response	STS_Q_RSP
%011010	Status Query Request	STS_Q_REQ
%011011	Reserved	
%011100	Message Update Request	MSG_UPDT_REQ
%011101	Radio Unit Monitor Request	RAD_MON_REQ
%011110	Reserved	
%011111	Call Alert Request	CALL_ALRT_REQ



SP-3-4661-RV2 TIA-102.AABC-B

ISP List (cont.)		
Opcode	Description	Alias
%100000	Acknowledge Response - Unit (From SU)	ACK_RSP_U
%100001	Reserved	
%100010	Reserved	
%100011	Cancel Service Request	CAN_SRV_REQ
%100100	Extended Function Response	EXT_FNCT_RSP
%100101	Reserved	
%100110	Reserved	
%100111	Emergency Alarm Request	EMRG_ALARM_REQ
%101000	Group Affiliation Request	GRP_AFF_REQ
%101001	Group Affiliation Query Response	GRP_AFF_Q_RSP
%101010	Reserved	
%101011	De-Registration Request	U_DE_REG_REQ
%101100	Unit Registration Request	U_REG_REQ
%101101	Location Registration Request	LOC_REG_REQ
%101110	Authentication Query	AUTH_Q
%101111	Authentication Response	AUTH_RSP
%110000	Protection Parameter Request	P_PARM_REQ
%110001	Reserved	
%110010	Identifier Update Request	IDEN_UP_REQ
%110011	Reserved	
%110100	Reserved	
%110101	Reserved	
%110110	Roaming Address Request	ROAM_ADDR_REQ
%110111	Roaming Address Response	ROAM_ADDR_RSP
%111000	Reserved	
%111001	Reserved	
%111010	Reserved	
%111011	Reserved	
%111100	Reserved	
%111101	Reserved	
%111110	Reserved	
%111111	Reserved	



SP-3-4661-RV2 TIA-102.AABC-B

OSP List		
Opcode	Description	Alias
%000000	Group Voice Channel Grant	GRP_V_CH_GRANT
%000001	Reserved	
%000010	Group Voice Channel Grant Update	GRP_V_CH_GRANT_UPDT
%000011	Group Voice Channel Grant Update - Explicit	GRP_V_CH_GRANT_UPDT_EXP
%000100	Unit To Unit Voice Channel Grant	UU_V_CH_GRANT
%000101	Unit To Unit Answer Request	UU_ANS_REQ
%000110	Unit To Unit Voice Channel Grant Update	UU_V_CH_GRANT_UPDT
%000111	Reserved	
%001000	Telephone Interconnect Voice Channel Grant	TELE_INT_CH_GRANT
%001001	Reserved	
%001010	Telephone Interconnect Answer Request	TELE_INT_ANS_REQ
%001011	Reserved	
%001100	Reserved	
%001101	Reserved	
%001110	Reserved	
%001111	Reserved	
%010000	Individual Data Channel Grant(OBSOLETE)	IND_DATA_CH_GRANT
%010001	Group Data Channel Grant(OBSOLETE)	GRP_DATA_CH_GRANT
%010010	Group Data Channel Announcement (OBSOLETE)	GRP_DATA_CH_ANN
%010011	Group Data Channel Announcement-Explicit (OBSOLETE)	GRP_DATA_CH_ANN_EXP
%010100	SNDCP Data Channel Grant	SN-DATA_CHN_GNT
%010101	SNDCP Data Page Request	SN-DATA_PAGE_REQ
%010110	SNDCP Data Channel Announcement -Explicit	SN-DATA_CHN_ANN_EXP
%010111	Reserved	
%011000	Status Update	STS_UPDT
%011001	Reserved	
%011010	Status Query	STS_Q
%011011	Reserved	
%011100	Message Update	MSG_UPDT
%011101	Radio Unit Monitor Command	RAD_MON_CMD
%011110	Reserved	
%011111	Call Alert	CALL_ALRT



SP-3-4661-RV2 TIA-102.AABC-B

OSP List (cont.)		
Opcode	Description	Alias
%100000	Acknowledge Response - FNE	ACK_RSP_FNE
%100001	Queued Response	QUE_RSP
%100010	Reserved	
%100011	Reserved	
%100100	Extended Function Command	EXT_FNCT_CMD
%100101	Reserved	
%100110	Reserved	
%100111	Deny Response	DENY_RSP
%101000	Group Affiliation Response	GRP_AFF_RSP
%101001	Secondary Control Channel Broadcast - Explicit	SCCB_EXP
%101010	Group Affiliation Query	GRP_AFF_Q
%101011	Location Registration Response	LOC_REG_RSP
%101100	Unit Registration Response	U_REG_RSP
%101101	Unit Registration Command	U_REG_CMD
%101110	Authentication Command	AUTH_CMD
%101111	De-Registration Acknowledge	U_DE_REG_ACK
%110000	Reserved	
%110001	Reserved	
%110010	Reserved	
%110011	Reserved	
%110100	Identifier Update for VHF/UHF Bands	IDEN_UP_VU
%110101	Time and Date Announcement	TIME_DATE_ANN
%110110	Roaming Address Command	ROAM_ADDR_CMD
%110111	Roaming Address Update	ROAM_ADDR_UPDT
%111000	System Service Broadcast	SYS_SRV_BCST
%111001	Secondary Control Channel Broadcast	SCCB
%111010	RFSS Status Broadcast	RFSS_STS_BCST
%111011	Network Status Broadcast	NET_STS_BCST
%111100	Adjacent Status Broadcast	ADJ_STS_BCST
%111101	Identifier Update	IDEN_UP
%111110	Protection Parameter Broadcast	P_PARM_BCST
%111111	Protection Parameter Update	P_PARM_UPDT



SP-3-4661-RV2 TIA-102.AABC-B

Annex E. List of Acronyms (Informative)

ACK_RSP_FNE = Acknowledge response-FNE (to SU)

ACK_RSP_U = Acknowledge response-unit (from SU)

ADJ_STS_BCST = Adjacent site status broadcast

AIV = Additional Information Valid

AUTH_RSP = Authentication response

CAI = Common Air Interface

CAN_SRV_REQ = Cancel service request

CRC = Cyclic Redundancy Check

DAC = Data Access Control

DENY_RSP = Deny response

EMRG_ALARM_REQ = Emergency alarm request

FNE = Fixed Network Equipment

GRP_AFF_Q = Group affiliation query

GRP_AFF_Q_RSP = Group affiliation query response

GRP_AFF_REQ = Group affiliation request

GRP_AFF_RSP = Group affiliation response

GRP_DATA_CH_ANN = Group Data channel announcement

GRP_DATA_CH_ANN_EXP = Group Data channel announcement, explicit

GRP_DATA_CH_GRANT = Group Data channel grant

GRP_DATA_REQ = Group Data service request

GRP_V_CH_GRANT = Group voice channel grant

GRP_V_CH_GRANT_UPDT = Group voice channel grant update

GRP_V_REQ = Group voice service request

IDEN_UP = Identifier Update

IDEN_UP_REQ = Identifier Update request

IND_DATA_CH_GRANT = Individual DATA channel grant

IND_DATA_REQ = Individual data service request

ISP = Inbound Signaling Packet

LRA = Location Registration Area

LOC_REG_REQ = Location Registration Request

LOC_REG_RSP = Location Registration Response

LSB = Least Significant Bit

MBT = Multiple Block Trunking packet

MFID = Manufacturer's ID

MI = Message Indicator



SP-3-4661-RV2 TIA-102.AABC-B

MRC = Mobile Radio Controller
MSB = Most Significant Bit

NET_STS_BCST = Network status broadcast

OSP = Outbound Signaling Packet

PDCH = Packet Data Channel
PSTN = Public Switched Telephone Network
P_PARM_BCST = Protection Parameter Broadcast

QUE_RSP = Queue Response

RAD_MON_CMD = Radio unit Monitor Command
RAD_MON_REQ = Radio unit Monitor Request
RFSS = RF Sub System
RFSS_STS_BCST = RFSS status broadcast
ROAM_ADDR_CMD = Roaming Address Command
ROAM_ADDR_REQ = Roaming Address Request
ROAM_ADDR_RSP = Roaming Address Response
ROAM_ADDR_UPDT = Roaming Address Update

SCCB = Secondary control channel broadcast
SNDP = Sub-Network Dependent Convergence Protocol
STS_Q = Status Query
STS_Q_REQ = Status Query request
STS_Q_RSP = Status Query response
STS_UPDT = Status update
STS_UPDT_REQ = Status update request
SU = Subscriber Unit
SYS_SRV_BCST = System service broadcast

TCCM = Trunking Control Channel Message
TELE_INT_ANS_REQ = PSTN to unit answer request
TELE_INT_ANS_RSP = Telephone Interconnect answer response
TELE_INT_CH_GRANT = Unit-PSTN voice channel grant
TELE_INT_DIAL_REQ = Telephone interconnect voice service request
TELE_INT_PSTN_REQ = Telephone interconnect voice service request
TSBK = Trunking Signaling Block

UU_ANS_REQ = Unit to unit answer request
UU_ANS_RSP = Unit to unit answer response
U_DE_REG_ACK = De-Registration acknowledge
U_DE_REG_REQ = De-Registration request
UU_V_CH_GRANT = Unit to unit voice channel grant
UU_V_CH_GRANT_UPDT = Unit to unit voice channel grant update
UU_V_REQ = Unit to unit voice service request



SP-3-4661-RV2 TIA-102.AABC-B

U_REG_CMD = Unit Registration command

U_REG_REQ = Unit registration request

U_REG_RSP = Unit registration response

WACN = Wide Area Communication Network

Annex F. Trunking Channel Addressing (Informative)

The RF spectrum will be addressed as ranges. Each range consists of a set of continuous channels which are defined by common parameters of channel spacing, channel bandwidth, and transmit offset frequency. For each range there will be a base frequency to indicate the subscriber receive frequency to associate with the first channel of this range. The base frequency along with the channel spacing, is used to determine the actual channel frequency. $[(\text{base frequency}) + (\text{Channel Number} \times \text{Channel Spacing})]$

One example of some parameters for common 800 MHz trunking could be 25 kHz channel spacing, 25 kHz channel bandwidth, 45 MHz transmit offset, and a base frequency of 851.0125 MHz. Another example that is analyzed in more detail in this annex for the common 800 MHz trunking band would be 6.25 kHz channel spacing, 12.5 kHz channel bandwidth, 45 MHz transmit offset, and a base frequency of 851.00625 MHz. This set of parameters allows 12.5 kHz channels to be addressed on either even or odd multiples of 6.25 kHz. These parameters can address channels that coincide with common 25 kHz channels, or pairs of 12.5 kHz channels that are formed by splitting a 25 kHz channel into two 12.5 kHz channels.

Each range has the capacity to address up to 4K unique channels. The span of each range is dependent upon the channel spacing for this range (e.g. 4K of channels with a 12.5 kHz channel spacing would produce a 50 MHz span of frequency from the base frequency associated with this range).

Each control channel will be capable of uniquely addressing up to 16 different ranges. The control channel will broadcast the necessary information concerning the particular range(s) being used at this control channel. This will be both as a basic system status update and as a response to query by subscriber unit (SU). The range information will consist of a unique identifier, a base frequency, channel spacing, transmit frequency offset, and a channel bandwidth. The subscriber unit will save this information for future use for channel assignments. (The system status update information may also be directed to a secondary control channel especially if the number of identifiers employed at a site are extensive.)

A channel will be defined by an identifier, and a channel number. The subscriber unit will reference the identified range information and use this to determine the associated channel frequency. The Channel field defined in this document is used to address the channel. This supports 16 Identifiers, and 4K Channel Numbers.

SP-3-4661-RV2 TIA-102.AABC-B

Example of Identifier

As an example, to represent identifier 0 as addressing the 806 MHz band for 12.5 kHz bandwidth channels, and 6.25 kHz channel spacing, the following values would populate the fields of the Identifier Update message:

Identifier = %0000	[Identifier 0]
BW = \$64	[12.5 kHz = 100 • 0.125 kHz]
Transmit Offset = %010110100	[45 MHz = 180 • 0.250 MHz]
	[leading "0" indicates SU TX below SU RX]
Channel Spacing = \$32	[6.25 kHz = 50 • 0.125 kHz]
Base Frequency = 170,201,250	[851.00625 MHz = 170,201,250 • 5 Hz]

The tenth channel of Identifier 0 would appear as the following 2 octet vector:

0	0	0	0	0	0	0	0
0	0	0	0	1	0	0	1

This would translate to $(851.00625 \text{ MHz}) + ((6.25 \text{ kHz}) \cdot (9)) = 851.06250 \text{ MHz}$ for the receive frequency for the subscriber unit assigned this channel. This is illustrated in Figure F-1.

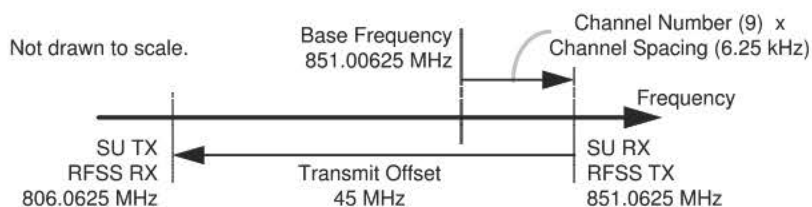


Figure F-1 Example Channel Calculation



SP-3-4661-RV2 TIA-102.AABC-B

Summary information

IDENTIFIER	BASE FREQUENCY (BASE)	BANDWIDTH (BW)	TRANSMIT OFFSET (TX OFF)	CHANNEL SPACING (CH SP)	COMMENTS
\$0 - \$F	5 Hz steps; to over 20 GHz	125 Hz steps; up to 63.875 kHz	250 kHz, steps ; up to 63.875 MHz; +/- base frequency	125 Hz steps; up to 128 kHz	SU RX frequency (MHz) = [(BASE x .000005) + (CH Number x CH SP x .000125)] SU TX frequency (MHz) = [(base x .000005) + (CH Number x CH SP x .000125) +/- (TR OFF) x (.250)]
0	170,201,250 (851.00625 MHz)	100 (12.5 kHz)	\$0 B4 (SU TX 45 MHz below SU RX)	50 (6.25 kHz)	SU TX : 806.00625 MHz - 831.60000 MHz SU RX : 851.00625 MHz - 876.60000 MHz
1					<i>If needed</i>
2					<i>If needed</i>
3					<i>If needed</i>
4					<i>If needed</i>
5					<i>If needed</i>
6					<i>If needed</i>
7					<i>If needed</i>
8					<i>If needed</i>
9					<i>If needed</i>
10					<i>If needed</i>
11					<i>If needed</i>
12					<i>If needed</i>
13					<i>If needed</i>
14					<i>If needed</i>
15					<i>If needed</i>

It should be noted from this table that only one Identifier is required (here selected as Identifier 0). There may be additional Identifiers (up to a total of 16) as required.



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